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COMMUNICATIONS.

Authors of communications read before the Society, or any of its Local Sections, are requested to take notice that under Rule 43 of the Bye-laws the Society has the right of priority of publication for three months of all such papers. Infringement of this Bye-law renders papers liable to be rejected by the Publication Committee, or ordered to be abstracted for the Journal, in which case no reprints can be furnished to the author.

INTERNATIONAL CONGRESS OF APPLIED CHEMISTRY.

The attention of Members of the Society is called to the fact that the International Congress of Applied Chemistry will meet in Berlin, during Whitsuntide week of next year. A committee of this Society has been formed to co-operate with the other British Chemical Societies in endeavouring to secure an adequate representation of British Chemical Industry, and it is requested that the names of those proposing to attend the Congress be forwarded to the General Secretary, in order that a formal invitation from the Organisation Committee in Berlin may be sent to them.

INTERNATIONAL FIRE EXHIBITION.

The President, Mr. Ivan Levinstein, has been offered and has accepted a seat on the Advisory Council of the International Fire Exhibition.

TECHNOLEXICON.

The *Verein Deutscher Ingenieure* has undertaken to produce a reliable technical dictionary in three languages—English, French, and German—and has asked this Society to furnish the names of such scientific and industrial men as are willing to supply the technical expressions of their own special branches of industry. The assistance to be rendered must be gratuitous, as otherwise the expense would be prohibitive; but no money is asked for by the German Society, though it has already spent considerable sums upon the work, and has provided an editor, Dr. Hubert Jansen, of Berlin, with a staff, to collate the materials supplied.

The Council of this Society agreed to co-operate in the work, and appointed a special committee, consisting of the President, Hon. Treasurer, Drs. Lewkowitsch, Kohn, Messel, Redwood, and Squire, and Messrs. Beilby, Hehner, Newlands, Reid, and Watson Smith to decide upon the form of co-operation. It has been determined to select one or more representatives for each class of the Journal and Patent Literature; and the committee now asks for volunteers to undertake a class or division of a class. To those who intimate their wish to help, full particulars of the plan of the work, with instructions how to proceed, will be sent. Offers of co-operation should be addressed to the General Secretary.

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ENGLISH PATENT SPECIFICATIONS may be obtained by post by remitting 8d. each—the price now fixed for all specifications, postage included—to C. N. Dalton, Esq., Comptroller of the Patent Office, Southampton Buildings, Chancery Lane, London, W.C.



I.—PLANT, APPARATUS, AND MACHINERY.

ENGLISH PATENTS.

Liquid Substances, Thin or Thick; Construction of a Vessel by Means of which —, can be drawn off by Air Pressure. A. Büttner, Breslau, Germany. Eng. Pat. 12,407, May 31, 1902.

THE vessel is provided with a cylindrical cover containing a piston actuated by pressing a knob on the top of the hollow piston rod which passes outside; a spring normally maintains the piston at the highest point; on pressing the knob, the air pressure produced in the vessel, forces the liquid out of a nozzle or tube leading to the bottom of the vessel. A hole may be made in the knob, which is closed by the finger on pressing, but admits air to the vessel on the release of the piston.—J. W. H.

Solids Deposited in Liquid-purifying Apparatus; Collecting —. T. H. Butt, Bradford. Eng. Pat. 19,349, Sept. 28, 1901.

THE apparatus is intended to deal with the semi-liquid solids collected by the filtering apparatus described in Eng. Pat. 20,205, 1900 (this Journal, 1901, 233), and consists of a tank placed at a lower level than the discharge valve of the stated apparatus, within which tank are placed two or more horizontal grids, the space between these being filled with breeze or other filtering material. Space is left for the filtered liquid in the lower part of the tank; and in one angle of the bottom, a grid is formed connected to a suction pipe. A steam-pipe coil is adjusted within the tank. Another form of tank is shown, in which the grids are arranged vertically.—E. S.

Drying Apparatus; Centrifugal —. C. Stute, Ricklingen, Germany. Eng. Pat. 13,788, June 17, 1902.

THE invention relates to the ordinary centrifugal hydro-extractor; the sides of the cage may be removed by a crane, the action of lifting releasing the sides from the bottom. The washed clothes or other contents do not fall out until pushed—into a convenient receptacle.—J. W. H.

Evaporating and Condensing Apparatus. D. B. Morison, Hartlepool. Eng. Pat. 21,282, Oct. 23, 1901.

THE apparatus, to be used either as an evaporator or condenser, consists of a vessel having a horizontal coil-containing lower portion and a vertical upper portion containing horizontally disposed coils, the ends of which are connected to opposite sides of vertical hollow standards constituting the inlet and outlet of the coils. The upper and lower portions of the vessel can be disconnected, each being provided with a door to afford access to the coils, that of the upper portion being narrow and situated near the standards. The coils of the upper portion may be supported on the side remote from the standards by means of clamps on a vertical stay or bracket secured to the base.

—J. F. B.

Evaporator Heated by Steam, Hot Vapours, or Gases. V. F. Feeny, London. From Abwärme-Kraftmaschinen-Gesellschaft, Berlin. Eng. Pat. 13,116, June 9, 1902.

A VAPORISER, suitable for cold-vapour engines, comprising a vertical boiler having vertical pipes, down which hot vapours or gases flow, and several horizontal partitions through which the pipes pass, a certain amount of free space being left round each pipe in the holes in the partitions. The liquid to be vaporised is supplied to the boiler above the uppermost partition, and flows in a thin film down the pipes, the vapours produced passing up a vapour-collecting pipe which rises centrally through the partitions. (See Eng. Pat. 13,757 of 1902; this Journal, 1902, 1127.)—H. B.

Heating of Liquids of Low Boiling Points. V. F. Feeny, London. From The Abwärme-Kraftmaschinen-Gesellschaft, Berlin. Eng. Pat. 13,512, June 14, 1902.

A METHOD, applicable to cold-vapour engines, of heating liquids of low boiling points by means of exhaust gases, in

which the said gases, on their way to the liquid-vaporiser, are passed through a closed vessel and brought into contact with water flowing over coke or the like, so that they are mixed with the steam which is generated, and reach the vaporiser in a purified condition. (See preceding abstract, and Eng. Pat. 13,757 of 1902; this Journal, 1902, 1127.)

—H. B.

Feed-Water Heaters, Filters, and Purifiers. M. P. Osbourn, Camden, N.J., U.S.A. Eng. Pat. 12,303, May 29, 1902.

IN the combined feed-water heater and purifier, means for regulating the supply of purifying agent in proportion to the water supply are provided, consisting of valves on the two supplies so connected that they are operated together by the action of a float in the heater; a yielding connection, such as a spring, may be provided between the two valves so as to permit of a slight further movement of one of them, after the other has been closed. After treatment with chemicals and steam in the heater, the water passes through a series of purifying chambers, which may be arranged one above the other, and which contain in their lower portions a series of inclined obstructions or barriers, forming pockets in which the precipitated sediment may collect whilst the water finds a free passage above them.

—J. F. B.

Filters; Improvements in —. J. Kostalek, Prague, Bohemia. Eng. Pat. 17,491, Aug. 8, 1902.

IN sand or similar filters arranged with parallel flow, the delivery and inlet tubes are made readily removable for cleansing, by the use of rubber flange packings and rubber stoppers.—J. W. H.

UNITED STATES PATENTS.

Evaporating Apparatus; Vacuum —. C. Ordway, Brooklyn, New York. U.S. Pat. 709,172, Sept. 16, 1902.

THE apparatus consists of a series of sections, each section comprising an upper vapour chamber connected with the exhausting apparatus and a lower liquor chamber; these chambers are connected together by means of two "uptakes" and one "downtake"; the uptakes consist of a number of tubes in a common jacket by which heat is applied; the downtake is a single-jacketed tube. The incoming liquid is circulated through the downtake jacket before entering the apparatus; it thus determines the downward circulation of the liquid in the downtake and becomes heated itself. A "vacuum leg" extends below from each section, and is provided at its base with a screw conveyor for the removal of precipitated material.

—J. W. H.

Evaporator. W. Bender, Assignor to the Zellstoff-fabrik Düren Hermann Maria Schoeller and Co., Düren, Germany. U.S. Pat. 709,297, Sept. 16, 1902.

THE evaporator is especially intended for thick liquids, such as pitch, molten resin, &c., and consists of a series of inclined tubes provided with a steam jacket; the tubes communicate, by means of two "headers," with the main reservoir for the liquid, from which the gases make their exit. The heated inclined tubes cause a circulation of the whole liquid. A U-shaped trough connects the two headers together inside the main reservoir.—J. W. H.

II.—FUEL, GAS, AND LIGHT.

Coal; Calorific Power of —. M. Goutal. Comptes Rend., 135, [12], 477—479.

THE calorific power calculated from the results of analysis by any of the formulae suggested by Dulong, Scheurer-Kestner, Cornut, Ser, Gmelin, &c., often differs considerably from the value obtained by experiment in the Mahler bomb or other form of calorimeter. From calorific determinations of some 600 coals of different kinds, the author has deduced a formula, the results of calculating by which agree within 1 per cent. in nearly all cases with those of experiment. The fixed carbon (C), volatile matters (V), ash and



moisture, are determined; the calorific value is then given by the formula $P = 82C + aV$, where a is a coefficient which is a function of V , the percentage of volatile matters in the coal taken as free from ash and moisture (so that $V' = \frac{100V}{100+V}$). The values of a corresponding to different values of V are plotted in a curve which differs but little from a straight line. When $V' = 5, 10, 15, 20, 25, 30, 35, 40$ per cent., $a = 145, 130, 117, 109, 103, 98, 94, 80$ respectively.

In the case of anthracites, $a = 100$. The average value of the calorific power of anthracite is 8,250 cal., and it rises with the content of volatile matter to a maximum of about 8,700, when V is between 10 and 30 per cent., falling again as the percentage of volatile matter increases further.

—J. T. D.

Coal; Determination of Sulphur in — C. W. Stoddart.

See under XXIII., page 1298.

Sulphur in Coal and Pyrites; Determination of — A. Reitlinger.

See under XXIII., page 1298.

Smoke; Prevention of — J. S. Raworth. Paper read before Section G of the British Association, Belfast, 1902. Electrician, 1902, 49, [1271], 911.

For the prevention of smoke, the author recommends the Wilson process of squirting a mixture of air and nitrate of soda solution on the fire. This he has found to give very satisfactory results. In order to ascertain how the process affected the output of the boiler and its evaporative efficiency, H. W. Wilkinson made a series of tests with a Babcock and Wilcox water-tube boiler fitted with a Wilson apparatus. The results are given in the following table, and show that, assuming existing conditions, (a) = 100; then (b), air injected, = 108; and (c), Wilson process, = 122.

	With Air and Nitrate of Soda.	With Air only.	Ordinary Conditions.	With Air and Nitrate of Soda.
Duration of test	7.03 hours	7 hours	7.42 hours	7 hours
Average pressure of steam	113.3 lb.	115 lb.	117.7 lb.	115.3 lb.
Average temperature of steam (superheated)	469° F.	473° F.	459° F.	466° F.
Average temperature of steam feed	143° F.	140° F.	146° F.	150° F.
Factor of evaporation	1.228	1.235	1.22	1.219
Total coal	2,856 lb.	3,416 lb.	3,248 lb.	2,744 lb.
Total coal per hour	403 lb.	488 lb.	438 lb.	392 lb.
Total coal per hour per square foot of grate	15 lb.	18 lb.	16.2 lb.	14.5 lb.
Total water	19,520 lb.	19,485 lb.	17,680 lb.	17,886 lb.
Total water per hour	2,755 lb.	2,784 lb.	2,334 lb.	2,555 lb.
Water evaporated per pound of coal (actual conditions) ..	6.83	5.7	5.32	6.52
Water evaporated per pound of coal from and at 212° F. .	8.38	7.01	6.5	7.95

—A. S.

Water-Gas in the London Gas Supply. Report by the Chemist to the London County Council.

THE gas supplied to London by the South Metropolitan, Gas Light and Coke, and Commercial Gas Companies has been continuously examined during the period June 1, 1901, to May 17, 1902, as to its content in carbonic oxide, with a view to ascertaining the proportion of water-gas present. The results obtained were as follows:—

(1) Fifty-seven per cent. of the samples taken in the district supplied by the Gas Light and Coke Company contained under 12 per cent., and 94 per cent., under 16 per cent. of carbonic oxide.

(2) This amount of carbonic oxide varied little day or night.

(3) Of the samples collected in the area supplied by the Commercial Gas Company, 19 per cent. contained less than 12 per cent., and 76 per cent. less than 16 per cent. of carbonic oxide.

(4) This percentage of carbonic oxide was higher during the hours of lighting.

The gas supplied by the South Metropolitan Gas Company was not found to contain carbonic oxide in sufficient quantity to indicate the presence of water-gas. The results show that the gas companies are able to supply gas of the statutory illuminating power, even when the amount of carbonic oxide present does not exceed 12 per cent. It is recommended that when the Board of Trade introduces a measure limiting the extent of enrichment of coal-gas by means of carburetted water-gas, the Council should seek to insert a clause stating that the whole amount of carbonic oxide present, as supplied to London, shall not exceed 14 per cent. by volume.—A. S.

Alcohol as an Illuminant. L. Denayrouze. Bull. French Phys. Soc.; through Pharm. J., 1902, 69, [1682], 295.

THE author compares the cost of alcohol and petroleum as illuminants in the Denayrouze lamp. The latter consists essentially of a wick, conducting the liquid by capillarity into a chamber where it is vaporised, the necessary heat being produced by a copper bar, which derives it from the lamp itself. The vapour passes through a small channel into a kind of Bunsen burner, above which the mantle is fixed.

With a consumption of 1.08 gm. of pure alcohol or 0.64 gm. of "carburetted alcohol" (this Journal, 1902, 960) per candle-hour, the cost is estimated at 0.00478d. and 0.00298d. per candle-hour respectively, as compared with 0.01428d. for petroleum. (See also this Journal, 1902, 959–960.)—A. S.

Ferrocyanide Manufacture at the Hague Gas Works. J. Rutten.

See under VII., page 1277.

ENGLISH PATENTS.

Furnaces and like Apparatus for Burning of Fuel. W. H. Fenner, New York, U.S.A. Eng. Pat. 17,434, Aug. 30, 1901.

SEE U.S. Pat. 698,190; this Journal, 1902, 962.—R. S.

Furnaces. F. W. Monteith, Toronto. Eng. Pat. 3373, Feb. 10, 1902.

To prevent smoke and economise fuel in furnaces, carburetted air is fed through perforated pipes into the fire-box, and the gases formed are carried off at the moment of their creation by means of perforated pipes leading to the smoke stack. The carburetted air used, is obtained by spraying, by means of an atomiser, an oil into a reservoir containing air under pressure.—R. S.

Furnaces; Method of Promoting Combustion in — K. Albrecht, Madrid. Eng. Pat. 14,517, June 30, 1902.

This method consists "in returning the furnace fumes or gases from the back of the boiler or flue to the furnace fire to be burned."—R. S.

Ammonia and Tar from Furnace Gases or Producer Gases, and Apparatus therefor. T. Kighy, St. Helens. Eng. Pat. 20,716, Oct. 16, 1901.

THE hot gases are passed through a long tank, through which cool water is flowing in the opposite direction, the tank being divided transversely into compartments provided with spraying devices, whereby the gases are cooled to 30°–70° C. The hot water flowing from the tank is used for heating and saturating with moisture the air required

for the producer, and the water, cooled by this operation, is returned to the gas-cooling tank. The cooled gases are passed into a tower provided with horizontal perforated partitions over which "acidified ammonia liquor" flows, for the recovery of the ammonia, and to prevent the dilution of the liquor by cooling and condensation of the water-saturated gases, steam is passed through a heating coil situated within the receptacle from which the liquor flows over the perforated partitions.—H. B.

Oil Fuel; Apparatus for Burning —. A. Renny, Singapore. Eng. Pat. 22,614, Nov. 9, 1901.

THE liquid-fuel burner consists of an outer casing within which two concentric tubes are fitted by screwing, these forming nozzles at their outlet ends. The three passages formed by means of this construction are connected up as follows: the outer one to the oil supply, the middle one to the open air or to a supply of air under pressure, and the intervening one to a steam supply. The burner is used for steam generators, for smelting, &c.—R. S.

[*Oil*] *Gas; Production of* —. G. H. Hughes, London. Eng. Pat. 21,356, Oct. 24, 1901.

THE cylindrical retort in which the oil is vaporised is provided internally with a removable rotating shaft, to which a series of baffles formed of eccentrically-mounted discs, &c., is secured.—H. B.

Carbide Holders. G. G. Smith, Florence. Eng. Pat. 16,701, Aug. 20, 1901.

THE holder is a metal cylinder open at both ends, and closed by means of two flat plates tightened against rubber washers by rings fitted with bayonet catches. The device is intended for use in generators such as are described in Eng. Pats. 23,309, 1899, and 12,240, 1900 (this Journal, 1900, 137 and 1001); and has the advantage that after the ends have been punctured and the carbide decomposed, the cartridge can be recharged, only the ends having to be renewed. Concentrically within the cylinder is an empty tube of coarse gauze, which provides space for the expansion of the carbide by allowing the lime to pass through its meshes; and within that tube, extending half way along the cylinder from one end, is a full tube, which prevents water from reaching the carbide when the cartridge stands upright and the lower end has been punctured, until the outer cylinder is more than half submerged in the water.

—F. H. L.

Acetylene Gas Generators. G. G. Smith, Florence, Italy. Eng. Pat. 16,702, Aug. 20, 1901.

THIS patent refers to modifications in the generators described in Eng. Pats. 23,309, 1899, and 12,240, 1900 (this Journal, 1900, 137 and 1001), in which moving punches make holes in carbide cartridges. Having found that special weights are not required to operate the punches, the inventor now makes the falling holder bell lift a stirrup surrounding the cartridge, which first punches a hole in the bottom, and then raises the cartridge till a second fixed punch pierces the top; the punches being either hollow, or provided with longitudinal channels so as not to interfere with the entry of water. Immediately after the cartridge is perforated, the same mechanism upsets an intermediate reservoir of water, and allows its contents to attack the solid. Other mechanism causes the holder to punch a number of cartridges in succession. It is stated that the action of piercing does not affect the gas pressure appreciably.

—F. H. L.

Acetylene; Gas Generators particularly applicable for the Production of —. J. H. Ross, Birmingham. Eng. Pat. 17,458, Aug. 31, 1901.

AN automatic carbide-feed apparatus of the central hopper type, essentially a modification of the generator described in Eng. Pat. 9537, 1900 (this Journal, 1901, 564). The holder bell is made to move smoothly by having a vertical rod attached somewhat loosely to its crown, which rod slides easily in a fixed vertical tube fastened to a fixed part of the generator. The inverted cone at the base of the

hopper is formed obliquely, so that its apex lies on one side of the central rod. In small generators the detachable carbide vessel is inside the holder bell, though not carried by it; but in large apparatus, the holder is an annulus, and does not require removal from its seal each time the carbide has to be renewed.—F. H. L.

Acetylene and other Gases; Apparatus for Generating —. D. S. Keith, Toronto, Canada. Eng. Pat. 8369, April 10, 1902.

A CARBIDE-feed apparatus of the central hopper type, requiring granulated carbide. The rising holder is arranged as an annulus round the carbide hopper, and from the former, an upright lever extends which operates a rod bearing two cone-shaped valves at its base, that open or close the hopper mouth. The rod carries a depending cap which works in a water-seal so as to keep the hopper air-tight. The acetylene is made to travel through pipes and then to bubble through the water contained in the holder tank, which stands above the generating chamber.—F. H. L.

[*Acetylene*] *Gas Heating-Burners*. J. Harris and L. H. Vogel, Cleveland, U.S.A. Eng. Pat. 13,208, June 10, 1902.

A CIRCULAR atmospheric burner for acetylene in which means are provided to keep the gas cool, thus avoiding, so it is claimed, polymerisation, and the consequent deficiency of air. Over the usual circular mixing chamber are arranged (radially) slotted covers, rectangular in horizontal section but semicircular in vertical section; and above these are perforated caps at the orifices of which the acetylene finally burns. Thus the actual place of combustion is considerably above the top of the mixing chamber. The proportion between gas and air can be regulated by a screwed sleeve travelling over the inlet to the burner casing.—F. H. L.

Incandescent Vapour Lamp. R. Worms, Berlin. Eng. Pat. 12,086, May 27, 1902.

WITHIN the upper metallic casing of a suspended lamp is situated a vaporiser consisting of two long, concentric, hollow cylinders or truncated cones, up the annular passage between which the combustible liquid is fed. The vaporiser is placed vertically over the lamp chimney, and extends so far downwards below the top of the chimney that only its upper portion is heated by the waste gases, and metallic ribs or the like are attached externally to its lower portion to assist in keeping it cool. The combustible liquid is contained in a reservoir surrounding the upper metallic casing of the lamp.—H. B.

Incandescent Gas Lamps. R. Koch and L. Rothenberg, Berlin. Eng. Pat. 12,278, May 29, 1902.

IN incandescent gas lamps burning at ordinary gas pressure, an intense light is obtained, by supplying the air requisite for forming a suitable "gaseous air mixture" exclusively by a mixing tube prolonged below the gas-nozzle, and is open at the lower end. It is surrounded by the burner-tube, which extends downwards to the same point, and is provided with air-inlet holes at its lower end; the secondary supply of air, flowing up the annular channel between the two tubes, mingles with the combustible mixture just below the burner top.—H. B.

Gas Burners especially adapted for use with Incandescence Mantles. O. Wiederhold, Bloomfield, New Jersey. Eng. Pat. 12,409, May 31, 1902. (Under Internat. Conv., Nov. 4, 1901.)

THE base of the mixing-tube is screw-threaded upon a gas-inlet nipple, which has lateral passages for admission of the gas to the mixing-tube, and has its top formed conically to act as a needle valve. A diaphragm having a central perforation stretches across the tube immediately above the point of the needle, so that the gas supply may be regulated by screwing the tube up or down upon the nipple. The top of the mixing tube has lateral perforations, is closed by an inverted conical body, which deflects the mixture of gas and air through the perforations, and is surrounded by a perforated cylindrical casing which is in



turn enclosed in the outer casing of the burner top. The tubular socket for the base of the mantle-support is slotted, to facilitate the removal of the stump, should the support get broken.—H. B.

Arc Lamps; Carbide Electrodes for —, and Process of Manufacturing the same. R. Hopfelt, Berlin. Eng. Pat. 26,487, Dec. 27, 1901.

ELECTRODES composed of a carbide which is decomposable by water, are provided with a waterproof coating in one of the following ways:—(1) A sheathing of tin, zinc, or other metal having its point of fusion or volatilisation below 1,050° C., is slipped over the electrode. (2) The electrode is dipped into "an alcohol or alcoholoid," such as glycerin, which produces an external protective layer of lime; or it may be coated with a pasty mass, composed of glycerin, a metallic oxide, such as lead oxide, and a small quantity of carbou. (3) A varnish, such as tar, is applied.—H. B.

UNITED STATES PATENTS.

Bog Peat for Fuel Purposes; Process of Preparing —. A. Charon, Assignor to A. Duclos, Montreal. U.S. Pat. 709,664, Sept. 23, 1902.

THE peat is dried and then ground in a disintegrator, through which an electric current of from 110 to 220 volts is passing, so as to carbonise the peat. The carbonised product is mixed with slightly less than 1 per cent. of petroleum, and is compressed into briquettes.—H. B.

Fuel; Artificial —. C. B. Harris, Assignor to S. I. Atwater, Trustee, New York. U.S. Pat. 709,851, Sept. 23, 1902.

PETROLEUM coke, 5 lb.; Texas asphalt. or resin, 3.5 lb.; "glutinous matter," 1.5 lb.; water, 10 lb.; and coal dust, 80 lb., are incorporated together, moulded into briquettes, and dried.—H. B.

Fuel; Apparatus for Spraying and Burning Liquid —. A. Köhler, Hamburg. U.S. Pat. 709,579, Sept. 23, 1902.

AN apparatus for use with boilers and the like, in which the burners consist of concentric tubes, through which air and liquid fuel are forced, to form a spray. Pivotaly mounted between the air- and oil-supply pipes respectively is a distributing box from which issue the pipes leading to the burners. Each of the latter pipes has a pivotal joint between the distributing box and the burner. By turning the pipes and the distributing box on their pivots, the burners can be swung aside from beneath the boiler.—H. B.

Burner; Hydrocarbon —. Mary A. Hodge, Assignor to W. P. Holmes and L. M. Hodge, San Jose, Cal., U.S.A. U.S. Pat. 709,443, Sept. 16, 1902.

OIL and steam are forced through adjustable concentric annular passages and through a conical nozzle into a spherical atomising chamber, in which they impinge upon a deflecting block, to complete the atomisation. The mixture is carried forward through a vaporising chamber packed with wire-cloth or the like, and flows thence to the burner, a drip-chamber being provided to trap any oil which may escape vaporisation.—H. B.

Burner; Hydrocarbon — [for Boilers, &c.]. L. K. Leahy, Los Angeles, Cal. U.S. Pat. 709,782, Sept. 23, 1902.

A BURNER designed for use with crude petroleum and steam, in which the supplies of fuel and steam are regulated simultaneously and automatically by the steam pressure within the boiler.—H. B.

Furnace Gases; Process of Desulphurising —. E. Pollaczek, Budapest. U.S. Pat. 709,358, Sept. 16, 1902.

THE gases are passed through a sponge-like material, arranged in layers, alternating with the fuel, or arranged behind the fuel, and formed by the action of the gases upon a mass consisting of 10 to 15 parts of sawdust, 30 to 35

parts of non-caking coal, 20 to 25 parts of caking coal, 30 to 35 parts of peat, and 6 to 20 parts of caustic lime.

—H. B.

Gas Generator. C. J. Luther, Redbank, N.J. U.S. Pat. 709,788, Sept. 23, 1902.

THE apparatus comprises a generator, a vaporising chamber above the generator, pipes for feeding oil into the vaporising chamber, a series of vertical retorts surrounding the chamber and enclosed within gas passages which communicate with the generator, and sliding valves which normally close the lower ends of the retorts, and are adapted to close the gas passages. Coal is fed into the vertical retorts, where it is carbonised by the hot gases from the generator, which flow round the gas passages and are burned therein with additional air supplies. The coal-gas is led off to a gas-holder, and the coke is dropped into the generator, where it is treated with steam to produce water-gas; oil-gas is produced simultaneously in the vaporising chamber, and mixes with the water-gas. The mixed gases are superheated on flowing through the gas passages, and are led off to the gas-holder, to mingle with the coal-gas. Air is then blown through the coke in the generator to produce generator-gas for the carbonisation of the next charge of coal, and so on.—H. B.

Carbide Holder. F. Simonson, Stirling, Ill. U.S. Pat. 707,027, Aug. 12, 1902.

A CYLINDER, open at one end and closed at the other, is fitted with a lead weight resting on the bottom, so that when dropped into water, it always maintains a vertical position. The vessel is greater in length than in diameter, the dimensions being so selected that, according to the inventor, the current of acetylene rushing out of the cartridge when immersed in water, carries with it the lime sludge, and leaves the rest of the carbide fit for further attack.—F. H. L.

Acetylene Gas Generator. A. C. Einstein, St. Louis, Miss. U.S. Pat. 706,810, Aug. 12, 1902.

AN automatic water-to-carbide generator working on the contact principle, in which the supply of water is governed by the gas pressure. The upper part of the gas space of the apparatus contains a collapsible bag having a fixed bottom but a movable top. When the pressure in the decomposing vessel falls, the top of the bag drops, pressing downwards a spring-supported rod, which is the stem of the water valve.—F. H. L.

Acetylene Gas Generator. C. W. Metcalf, Tucson, Arizona. U.S. Pat. 709,344, Sept. 16, 1902.

AN automatic water-to-carbide generator of the flooding type, with the water-supply governed by the movements of the bell and the liquid coming from the holder tank. The water pipe has two mouths, of different sizes; the large one is ordinarily used, but the small one comes into operation first when the apparatus is charged, so that gas production may not begin too suddenly. The carbide is held in a pair of two-storey water-sealed vessels standing on a subdivided water tank, and at their side are purifiers filled with tubes containing sand held in position by means of plugs of felt. Inside each carbide vessel the water-supply pipe terminates in a detachable ball-valve.—F. H. L.

Acetylene Gas Generator. J. C. Charbeneau, Mount Clemens, Mich. U.S. Pat. 709,470, Sept. 23, 1902.

AN automatic water-to-carbide apparatus working on the flooded compartment system, in which the water supply is governed by the bell movements. The carbide is held in a horizontal rectangular tray divided into a number of chambers, which is put into a water-jacketed portion of the generator through a manhole at one end. The water falls into one of the compartments, and when the carbide therein is decomposed it runs over a partition into the next chamber. The act of opening the manhole shuts off the water supply, disconnects the generating chamber from the holder, and puts it into communication with the atmosphere through a vent-pipe.—F. H. L.



Burner ; Petroleum Incandescent-Light — M. Bramson, Warsaw, Assignor to H. F. Vogel, St. Louis, Miss., U.S.A. U.S. Pat. 709,198, Sept. 16, 1902.

A LAMP of the circular-wick type, in which the outer wick-tube is higher than the inner wick-tube, and a flange projecting inwards over the wick deflects the vapour towards the central air-distributor. Two superimposed conical perforated caps surround the outer wick-tubes, and from the space between them a mixture of hot and cold currents of air flows up into the interior of the mantle, impinging against the flame.—H. B.

III.—DESTRUCTIVE DISTILLATION, TAR PRODUCTS, PETROLEUM.

Acetone Oil ; Manufacture of — [from Wash Water of Wool Combs], with a View to its Adoption for Denaturing Alcohol. P. Baechlin. Rev. Chim. Ind., 15, [133], 240—242.

THE author describes the apparatus erected by Buisine for obtaining the ammonia, fatty acids, and potash from the wash-water of wool-combs. After being allowed to ferment for six days, the wash-water is concentrated by evaporation; during this process, ammonia is given off which is absorbed by sulphuric acid. The concentrated liquor is decomposed in large vats by sulphuric acid, and the fatty matter separated from the potassium sulphate in the filter-press. The expressed liquid is distilled and the acid vapours are passed into milk of lime. The calcium salts formed are dried, and on distillation yield acetone oil, 75 per cent. of which distils between 70° and 90°, and is suitable for denaturing alcohol, since it contains a large quantity of methyl ethyl ketone (b. pt. 81°).—J. McC.

Aromatic Hydrocarbons. E. Lippmann and J. Pollak. Monatsh., 1902, 23, [6], 670—671.

THE colour reactions given in the following table are observed by suspending the hydrocarbon in concentrated sulphuric acid, and adding in the cold a few drops of benzal chloride (benzylidichloride), $C_6H_5CHCl_2$:—

Hydrocarbon.	Colour.
Anthracene	Malachite green.
Naphthalene	Magenta.
*Benzene	Light yellow.
*Toluene	"
*Xylene	Orange.
Phenanthrene	Carmine.
Triphenylmethane	Faint yellow.
Picene	Olive-green after a short time.
Diphenylmethane	Brick-red.
Stilbene	Bluish green.
*Pseudocumene	Orange-red.
*Cymene	Orange.
Pyrene	Emerald-green becoming deep blue.
Acenaphthene	Dark blue.
Dibenzylanthracene	Yellowish-green.
Chrysene	Light yellow, then light green, and finally dark olive-green.

The hydrocarbons marked with an asterisk give the same colour with sulphuric acid alone, no alteration taking place on the addition of benzal chloride.—T. A. L.

Petroleum ; Composition of — C. F. Mabery. Amer. Chem. J., 28, [3], 165—198.

THE hydrocarbons with boiling points above 216°C., given in the accompanying table, were isolated from Pennsylvania petroleum.

The last two liquid hydrocarbons belong to the series C_nH_{2n-2} , members of which also occur in the less volatile portions of Canadian, Californian, and Texan oils, and their presence is considered to reveal a closer relationship than was hitherto suspected between Pennsylvania oil and the heavier oils from the other fields mentioned. By allowing 3 kilos. of the same Pennsylvania oil to evaporate spontaneously at ordinary temperature for 30 days, the author obtained 1 kilo. of an oil nearly corresponding in sp. gr. with $C_{28}H_{46}$, and having the percentage composition of the C_nH_{2n-2} series.

		Boiling Point.	Melting Point.
		°C.	°C.
Tridecane	$C_{13}H_{28}$	226	..
Tetradecane	$C_{14}H_{30}$	236—238	..
Pentadecane	$C_{15}H_{32}$	256—257	..
Hexadecane	$C_{16}H_{34}$	274—275	..
Heptadecane	$C_{17}H_{36}$	288—289	10
Octadecane	$C_{18}H_{38}$	300—301	20
Nonadecane	$C_{19}H_{40}$	210—212 (50 mm.)	33—34
Hydrocarbon, liquid at —10°.	$C_{21}H_{42}$	230—231	40—41
Heneicosane	$C_{21}H_{44}$	240—242 (50 mm.)	..
Hydrocarbon, liquid at —10°.			..
Docosane	$C_{22}H_{46}$	259—260 (50 mm.)	44
Hydrocarbon, liquid at —10°.			..
Tricosane	$C_{23}H_{48}$	272—274 (50 mm.)	45
Hydrocarbon, liquid at —10°.			..
Tetracosane	$C_{24}H_{50}$	280—282 (50 mm.)	48
Hydrocarbon, liquid at —10°.			..
Pentacosane	$C_{25}H_{52}$	292—294 (50 mm.)	53—54
Hydrocarbon, liquid at —10°.			..
Hexacosane	$C_{26}H_{54}$	310—312 (50 mm.)	58
Hydrocarbon, liquid at —10°.			..
Octocosane	$C_{28}H_{58}$	..	60

—C. S.

Petroleum from Beaumont ; Free Sulphur in — F. C. Thiele. Chem.-Zeit., 26, [77], 896—897.

A SAMPLE of sediment from a tank car, furnished the author, on analysis, the following composition :—Amorphous grey sulphur, 63.63; crystalline sulphur (m. pt. 132°C.), 6.81; crude petroleum, 29.56 per cent. Phosphorus compounds and arsenic sulphides were also present; and a terpene was isolated from the alcoholic solution of the substance. The crystalline sulphur was entirely soluble in caustic potash, and the cold solution evolved a fishy smell, due to nitrogen compounds. The formation of the sediment is ascribed to pressure in the tank car, whereby the solvent power of the crude oil suffered diminution. This circumstance forms the best proof of the presence of free sulphur in Beaumont oil. The cap rock overlying the oil deposit consists chiefly of calcium carbonate, but contains 1.58 per cent. of sulphur (free and in organic combination), and 0.21 per cent. in the form of sulphates, the amount being too large to regard as an accidental impurity.

The fact that Beaumont oil yields better distillates after storage, is due to the deposition of sulphur, which is then unable to influence the terpenes and resins during distillation. The dissolved sulphuretted hydrogen is harmless, and can readily be removed by blowing steam into the oil.

—C. S.

Benzene ; Action of Sulphur Chloride on — E. Lippmann and J. Pollak. Monatsh., 1902, 23, [6], 669.

COMMERCIAL benzene is heated for 192 hours with 15 per cent. of sulphur chloride, until no further evolution of hydrochloric acid takes place. The benzene is distilled off with steam, washed, dried over calcium chloride, and rectified. It boils constantly at 81°C., and is found to be free from thiophene, giving no indophenine reaction with isatin and sulphuric acid. Benzene free from thiophene is not acted on by sulphur chloride, even after heating for 10 hours to 100°C. Probably a halogen derivative of thiophene is formed.—T. A. L.

Diphenyl ; Pyrogenetic Production of —, by means of the Electric Current. W. Löb. Zeits. f. Elektrochem., 1902, 8, [40], 777—778.

BENZENE (say 50 grms.) is heated in a round flask over a water-bath, and the vapours are condensed in a vertical condenser with return flow, after passing over a carbon filament heated to a clear red-heat, care being taken that all air is expelled from the apparatus before switching on the current to the filament. After four hours of such treatment, about 11 grms. of white crystalline material, containing 7.5—8 grms. of pure diphenyl may be obtained by



distilling off the unaltered benzene in the flask. Beyond this period (of four hours), the boiling-point of the benzene is raised beyond that which renders the water-bath serviceable, and an oil-bath or sand-bath would have to be substituted. If the temperature of the carbon filament be too high, carbonisation occurs, and the deposited carbon thickens the filament, so that its resistance is less, and the temperature is reduced below that at which flashing occurs. There is provided in this way an automatic method of controlling the temperature. Platinum or nickel wires may be substituted for the filaments, but the temperature used should at first be unnecessarily high, so as to yield a slight deposit of carbon, which will assist the automatic temperature regulation.—W. G. M.

IV.—COLOURING MATTERS AND DYE STUFFS.

o-Hydroxycarboxylic Acids; Action of Sulphites on Aromatic —. H. Bucherer. Zeits. f. Farben- u. Textil-Chem., 1902, 1, [18], 477—480.

1-HYDROXY-2-NAPHTHOIC, 2-HYDROXY-1-NAPHTHOIC, and 2-HYDROXY-3-NAPHTHOIC acids lose their carboxyl groups and become converted into naphthols when they are heated with a solution of sodium bisulphite and caustic soda.

When an ammoniacal solution of ammonium sulphite is employed, the elimination of the carboxyl group again occurs, but the product in this case is the corresponding naphthylamine.

Salicylic acid, on the other hand, is not affected by these reagents.—G. T. M.

Halogen Dinitronaphthalenes. F. Ullmann and F. Consonno. Ber., 1902, 35, [15], 2802—2811.

WHEN α -chloronaphthalene is nitrated, it yields 1,4-chloronitronaphthalene, together with the 1,1'- and 1,4'-derivatives according to Ger. Pat. 120,585. Further nitration is said to yield a mixture of two chloro-dinitronaphthalenes melting at 180° and 106° C. Similarly, α -bromonaphthalene yields a nitro derivative melting at 85° C., and subsequently two bromodinitronaphthalenes, whilst the bromination of α -nitronaphthalene gives 1,4'-bromonitronaphthalene melting at 122°·5 C. Both the bromodinitro derivatives on reduction give 1,1'-diaminonaphthalene melting at 66°·5 C. Chlorination of α -nitronaphthalene yields 1,1'-chloronitronaphthalene melting at 94° C., which on nitration forms 1,4,1'-chlorodinitronaphthalene (m. pt. 138° C.), since on reduction it is converted into 1,4'-naphthylene diamine. The authors also find that the halogen atom in the 1,4,4'- or 1,4,1'-chloro- or bromo-dinitronaphthalene is readily replaceable. On heating with ammonia or substituted amines, the corresponding dinitronaphthylamines are formed, and with sodium carbonate or sodium ethylate the corresponding naphthols or naphthol ethers.—T. A. L.

Naphthoquinone; Hydroxy Derivatives of —. P. Friedländer and L. Silberstern. Monatsh. für Chem., 1902, 23, [6], 513—533.

OF the nine possible monohydroxy derivatives of naphthoquinone, only β -hydroxy- α -naphthoquinone (O:O:OH = 1:4:2) and Juglone (1:4:1') are known, whilst the 23 possible dihydroxy derivatives are represented by Naphthazarin (O:O:OH:OH = 1:4:1':2') and Isonaphthazarin (1:4:2:3). They are obtained by combining dihydroxynaphthalenes or aminonaphthols with diazo compounds, reducing the *p*- or *o*-azo derivatives, and reacting with acid oxidising agents on the aminodihydroxynaphthalenes or diamionaphthols formed. The authors by this method have synthesised Juglone, Naphthazarin, and Isonaphthazarin, and have also obtained from trihydroxynaphthalene a new isomeric naphthazarin (O:O:OH:OH = 1:4:2':3').

Juglone is obtained from 1,1'-aminonaphthol (Ger. Pat. 55,404). This product, melting at 94°—97° C., and giving a monacetyl derivative melting at 138° C., soluble in alkalis,

gives, with an equimolecular proportion of diazotised sulphanic acid, a garnet-red azo dyestuff. This, on reduction with zinc dust and hydrochloric acid, yields a reduction product, which is oxidised by ferric chloride to Juglone. By combining 1,1'-aminonaphthol or 1,1'-diamino- or dihydroxynaphthalene with two molecular proportions of diazotised sulphanic acid and reducing, the resulting solution yields Naphthazarin on air-oxidation alone.

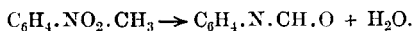
The starting point for Isonaphthazarin is from 2,3-dihydroxynaphthalene, which the authors have further characterised by preparing, by means of dimethyl sulphate and ethyl iodide, the methyl and ethyl ethers, the mono derivatives melting at 108° and 109° C. respectively, and the di-derivatives at 116° and 97° C. The aminodihydroxynaphthalene obtained by combining the above dihydroxynaphthalene with one molecular proportion of sulphanic acid, and reducing with stannous chloride and hydrochloric acid, does not yield β -hydroxy- β -naphthoquinone on oxidation, but a product, $C_{20}H_{10}O_7$, melting at about 250° C. With two molecular proportions of diazotised sulphanic acid and subsequent reduction, there results 1,4,2,3-diaminodihydroxynaphthalene, which, on oxidation with ferric chloride, yields Isonaphthazarin.

In order to obtain 2,3,1',4'-dihydroxynaphthoquinone, the authors start from 2,3,1',3'-naphtholtrisulphonic acid. When fused with caustic soda, the first product is a mixture of two dihydroxynaphthalene disulphonic acids, one of which, probably the 2,1',3,3'-dihydroxynaphthalene disulphonic acid, is separated by formaldehyde and hydrochloric acid as a dark blue precipitate, whilst the other, probably the 2,3,1',3', is not altered. By prolonging the soda fusion, a second sulphonic acid group is replaced, yielding a uniform product, 2,3,1',3'-trihydroxynaphthalene sulphonic acid. By heating this substance with dilute sulphuric acid in an autoclave, it gives 2,3,1-trihydroxynaphthalene, which crystallises from xylene in yellowish needles melting at 175° C. The product gives a triacetyl derivative melting at 144° C., and a trimethyl ether melting at 128° C., and smelling, on warming, of cloves and thymol. The azo dyestuff obtained by combination with diazotised sulphanic acid in weak acetic acid solution gives a reduction product with stannous chloride which, on oxidation, yields 2,3,1',4'-dihydroxynaphthoquinone analogous to Hystazarin. The substance has scarcely any affinity for mordants, and gives, with acetic anhydride, a diacetyl compound melting at 67° C.—T. A. L.

Anthranilic Acid; Electro-Thermal Formation of — from *o*-Nitrotoluene. W. Löb. Zeits. f. Elektrochem., 1902, 8, [40], 775—777.

CONTINUING previous experiments in the same direction (see this Journal, 1901, 588 and 1119), the author has experimented as to the action of heat upon *o*-nitrotoluene. If passed alone over a wire heated to dull redness, the vapour undergoes violent, almost explosive decomposition, accompanied by separation of nitric oxide and by carbonisation. But if the vapour be diluted with water-vapour, anthranilic acid and other bodies are produced in fair quantity when the temperature of the wire is between 500° and 1,000° C. The wire or ignited material used, may be of platinum, platinumiridium, nickel, iron, or carbon, without affecting the result qualitatively. Copper, however, behaves differently. The addition of volatile acid vapours (such as HCl) to the mixture of gases, does not affect the production of anthranilic acid. Among other constituents of the product are a large quantity of resin, containing many complex (azo- and azoxy-?) acids, with a little *o*-cresol and some salicylic acid. In a typical example quoted, 20 grms. of *o*-nitrotoluene and 100 grms. of water were boiled briskly in a round flask provided with an inverted condenser with return flow, so that the vapours, after expelling the air in the apparatus, passed over a platinum wire, 0·25 mm. in diameter, and 20 cm. long, heated to about 1,000° C. by a current of 3·5 amperes at 5·32 volts. The aqueous solution at once became yellow, then the nitrotoluene became darker in colour, and subsequently viscid, and subject to "bumping." After treatment for four hours, the liquid was freed from nitrotoluene, cresol, and salicylic acid by means of steam. The distillate

yielded 0.2—0.3 grm. of salicylic acid and 0.1 to 0.2 grm. of cresol. The residue from the distillation yielded 1.5—1.6 grm. of crude anthranilic acid, from which the pure acid was readily obtained. Copper wire cannot be used for the purpose, as when heated to redness it acts upon the mixture, and, in the presence of the water vapour, produces toluidine. It is probable that the main reaction may be explained by the separation of the elements of water from the *o*-nitro-toluene, with the production of anthranil, which, by boiling with alkalis, or by the action of heated water-vapour, is converted into anthranilic acid, thus—



The formation of salicylic acid, is due to the action of steam on anthranilic acid at a high temperature. Small quantities of ammonia were detected amongst the products of the reaction.—W. G. M.

Aminohydroxydiphenylamines and Analogous Substances.

R. Gnehm. Ber., 1902, **35**, [15], 3085—3088.

CERTAIN of the aminohydroxydiphenylamines which are of value for the production of sulphide dyestuffs are characterised by the author.

Dimethyl-p-amino-p-hydroxydiphenylamine is obtained by condensing dimethyl-p-phenylene diamine with hydroquinone, or in better yield by reducing so-called Phenol Blue. The product crystallises in white needles melting at 161° C., gives a diacetyl compound melting at 131° C., a dibenzoyl derivative melting at 210° C., a tetranitro compound melting at 228° C., and addition products with methyl and ethyl iodide melting respectively at 218° and 206° C.

Dimethyl-p-amino-m-hydroxydiphenylamine, obtained by condensing resorcinol with dimethyl-p-phenylene diamine, separates from water in greyish plates melting at 99° C. It gives a diacetyl compound melting at 101° C., a dibenzoyl compound melting at 112° C., and a nitrosamine melting at 125° C.

Dimethyl-p-diamino-diphenylamine, which is formed by reducing the indamine obtained from dimethylaniline and aniline, crystallises from water in long white needles melting at 116° C.

2-p-Dimethylanilino-2'-hydroxynaphthalene is obtained by condensing dimethyl-p-phenylene diamine with 2,2'-dihydroxynaphthalene. It crystallises from dilute alcohol in white plates melting at 127° C.—T. A. L.

Chrysazin with Hydriodic Acid; Reduction of —.

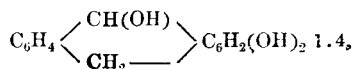
H. Schrobdsdorff. Ber., 1902, **35**, [15], 2930—2931.

THE reduction of chrysazin with hydriodic acid and red phosphorus, yields dihydroxyanthranol (chrysanthranol) melting at 177° C. It gives a triacetyl compound melting at 210° C., which, on oxidation with chromic and acetic acids, forms diacetylchrysazin, separating in yellow needles melting at 227°—232° C.—T. A. L.

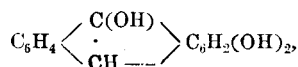
Quinizarin and Anthrarufin with Hydriodic Acid; Reduction of —.

B. Pleus. Ber., 1902, **35**, [15], 2923—2930.

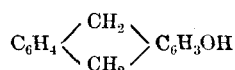
THE author has obtained from quinizarin and from anthrarufin a number of reduction products by the action of hydriodic acid and red phosphorus. From the former he has prepared hydroquinizarol—



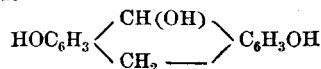
1.4-dihydroxyanthranol—



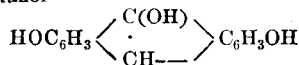
hydroxyhydroanthranol and hydro- α -anthranol—



which have been further characterised by their acetyl compounds. From anthrarufin he has obtained 1.5-dihydroxyhydroanthranol—



(golden yellow needles melting at 241° C.) and 1.5-dihydroxyanthranol—



These two compounds give triacetyl derivatives melting respectively at 163° C. and 185° C., which, on oxidation with chromic acid and acetic acid, yield diacetyl compounds. Moreover, dihydroxyanthranol can be converted into dihydroxyhydroanthranol by reduction with hydriodic acid and red phosphorus. The author has also prepared anthrarufin ethyl ether (yellow needles melting at 164° C.), its acetyl compound (yellow plates melting at 173° C.), and anthrarufin diethyl ether (long silky needles melting at 178° C.).—T. A. L.

Nitrosophenols and *o*-Nitrosophenol; Methyl Esters of the True —.

A. Baeyer and E. Knorr. Ber., 1902, **35**, [15], 3034—3037.

THE action of Caro's acid on *p*- and *o*-anisidine yields the corresponding nitroso-anisols, although the *p*-compound was not obtained free from nitro-anisol. The product melts at about 33° C., is soluble in all organic solvents with the exception of light petroleum spirit, and is very volatile with steam. It is hydrolysed by dilute sulphuric acid, soda, or alcoholic potash lye to *p*-nitrosophenol. Similarly *o*-anisidine is oxidised in cold aqueous solution by a weak acetic acid solution of Caro's acid. The *o*-nitroso-anisol is blown off with steam, and crystallises from acetone-petroleum spirit in colourless plates melting at 103° C. It is very stable towards alkalis, and yields tarry matters with acids. By dropping its aqueous solution into boiling potassium bisulphate solution and passing the vapours into soda lye, the sodium salt of *o*-nitrosophenol is obtained, the yield being 20 per cent. of the theoretical. Free *o*-nitrosophenol (*o*-quinone oxime) has only been obtained as an oil. It gives a sparingly soluble barium salt and an explosive silver salt.—T. A. L.

Indigo Blue from *o*-Nitro-acetophenone.

R. Camps. Arch. der Pharm., **240**, [6], 423—437.

EMMERLING and Engler (Ber., **3**, 855) found that *o*-nitro-acetophenone could be converted into Indigo by heating with zinc dust and soda-lime. The author has reinvestigated the subject, and finds that the reaction proceeds in two stages, the first product being an oil of characteristic odour, which by further heating yields Indigo. Further experiments showed that the oil could be obtained by reducing *o*-nitro-acetophenone in acid, alkaline, or neutral solution. The oil boils at 121°—127° C. at 17 mm. and is colourless and strongly refractive. Analyses gave figures which agree with those calculated for diaceto-hydrazobenzene. On heating the oil in a test tube it boils and then becomes coloured; finally dark violet vapours of Indigo are produced. Water condenses on the cool portion of the tube, and an odour of HCN is noticeable. The oil forms a platinum salt, and, by action of sodium nitrite and HCl, crystals melting at 101°—102° C. are obtainable, the composition of which is uncertain, but they yield Indigo on heating with water.—J. O. B.

Indigo Reduction with Zinc Dust and Ammonia.

A. Kufferath. Zeits. f. Farben- u. Textil-Chem., 1902, **1**, [18], 481. (Compare this Journal, 1901, 802.)

Two experimental vats were prepared with Indigo powder, B.A.S.F., zinc dust, and ammonia—one at 0° and the other at 50° C. Both vats gave good dark shades of blue on satin. An estimation of the Indigo white in the clear liquor of each vat showed that the warm solution contained less than half as much of this substance as the cold solution; but, on



the other hand, the precipitated Indigo from the hot vat contained 78.3 per cent. of Indigotin, whilst that from the cold vat only contained 50 per cent. of this compound.

The probable explanation of these facts is that Indigo white and its decomposition products, being only weak acids, form ammonium salts, which are hydrolysed in the warm solution, and consequently the substances themselves are precipitated. A large excess of ammonia is required to keep Indigo white in solution in the form of its ammonium derivative.—G. T. M.

Indulines of the Aminoazobenzene Melt. O. Fischer and E. Hepp. *Zeits. f. Farben- u. Textil-Chem.*, 1902, 1, [17], 457—459.

THE authors first refer to previous work by themselves and by Nietzki and Kehrman (see this Journal, 1891, 457; 1893, 669—671; 1896, 192, 536; 1900, 653, 654; and 1902, 35, 767).

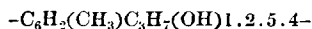
It has already been shown (this Journal, 1900, 654) that safranin derivatives react sometimes as *o*-quinoid, sometimes as *p*-quinoid compounds. Kehrman has tried the reaction between Aposafrazone and hydroxylamine, described by the authors, but without success. He concludes from this, that impure Aposafrazone was used by them. Kehrman's want of success is probably to be ascribed to the decomposing action of the strongly alkaline solution employed upon the hydroxylamine, an excess of which is required on this account. The Aposafrazone used by the authors was prepared as follows:—

Preparation of Pure Aposafrazone.—3 grms. of Aposafrazone hydrochloride, dissolved in 1,200 grms. of 20 per cent. alcohol, containing 6 grms. of caustic potash, are boiled for about an hour under an inverted condenser. The solution is filtered while boiling, the residue being boiled with 500 grms. of 20 per cent. alcohol. The orange-red coloured filtrate deposits, partly on cooling, partly on evaporation, brown needles, which are dissolved in a boiling 10 per cent. solution of hydrochloric acid, the hydrochloride of the base separating in green prisms from this solution on prolonged standing. The base is isolated by decomposing the hydrochloride with sodium acetate; it crystallises from dilute alcohol or light petroleum in lustrous green prisms, m. pt. 249° C. In a mol. wt. determination, 264 was found (calculated, 272). With this preparation the oxime is readily obtained.

The following compounds have been isolated from the aminoazobenzene melt:—1. Azophenine. 2. Anilino-aposafrazone. 3. Anilinomauveine. 4. Phenylanilinomauveine. 5. Paraphenylenediamine. 6. Di-*p*-aminodiphenylamine. 7. Diphenylfluorindine (in small quantity). As yet, it is interesting to observe, no derivatives of Aposafrazone have been found in it.—E. B.

Nitrosophenol Dyestuffs. H. Decker and B. Solonina. *Ber.*, 1902, 35, [15], 3217—3225.

ALTHOUGH Liebermann's reaction (the colour produced by the action of nitrous acid on phenols) has long been known, it has not been possible to isolate the simplest nitrosophenol dyestuffs. The authors have investigated the product obtained by the action of red fuming nitric acid (sp. gr. 1.47) on thymol ethyl ether, which they find to be the nitrate of thymoquinone ethylnitrate-thymolethyl-etherimine oxide. The base of this salt, on reduction, gives a colourless diphenylamine derivative, dithymolylamine diethyl ether, thymolyl being the radicle—



This product, on successive oxidation and reduction with hydriodic acid, gives dithymolylamine, which is the leuco derivative of the red quinoid substance thymoquinone-thymolimine. The alkali salt of this is blue, and identical with the dyestuff obtained according to Liebermann's method after the purification of the latter by reduction and oxidation. Most probably, therefore, the nitrosophenol dyestuffs are indophenols containing an indophenol oxide formed simultaneously. These stand in the relation of Nietzki's resorufin to resazurin, which are secondary products of dihydroxyindophenol and its oxide. The colour-

less reduction product of the nitroso dyestuffs is nothing else than a derivative of *p* dihydroxydiphenylamine, which is immediately converted on air-oxidation into the dyestuff.

—T. A. L.

Dyestuffs of the Aesculetin Series. II. C. Liebermann and S. Lindenbaum. *Ber.*, 1902, 35, [15], 2919—2923. (See this Journal, 1901, 1104.)

By treating aesculetin in small quantities, suspended in water, with sodium amalgam, it is converted into aesculetin dihydride and hydro-aesculetin, $C_{15}H_{14}O_5$. The former compound, $C_9H_8O_4$, crystallises in white plates, melting at 200° C., and gives a characteristic reaction when cautiously treated with ammonia, yielding a dyestuff dissolving in water with an eosine colour and a fluorescence similar to that of the aescorein sulphonic acid salts. The product, Aesculamein, dyes wool a faint red, the ordinary mordants only slightly, but the reverse with some of Scheurer's mordants. The brominated dyestuff gives bluish-violet shades on wool.

—T. A. L.

Aromatic Nitro-Compounds; Influence of the Cathode Material on the Electrolytic Reduction of —. W. Löb.

See under XI. A., page 1282.

Monohydroxybenzophenones. F. Ullmann and J. Goldberg.

See under XX., page 1293.

Dyestuffs; New Method for the Qualitative Analysis of Artificial —. J. Pokorný.

See under XXIII., page 1299.

ENGLISH PATENTS.

Phenylamidoacetonitrile [Indigo Dyestuffs] and Homologues thereof; Manufacture of —. O. Imray. From Meister, Lucius and Brünig, Hoechst a/Main. Eng. Pat. 21,077, Oct. 21, 1901.

SEE Fr. Pat. 315,940; this Journal, 1902, 543.—T. A. L.

Sulphur Dyestuffs from Dialkylamido-orydiphenylamines and New Intermediate Products; Manufacture of Purified —. R. B. Ransford. From L. Cassella and Co., Frankfurt-on-Main. Eng. Pat. 20,741, Oct. 16, 1901.

A METHOD for purifying the dyestuffs obtained according to Eng. Pat. 16,247 of 1900 (this Journal, 1901, 889). See Fr. Pat. 303,524 (suppl.); this Journal, 1902, 402.

—T. A. L.

Colouring Matter [Azo Dyestuffs], of Lakes therefrom, and of an Intermediate Product relating thereto; Manufacture of a New —. J. Y. Johnson. From the Badische Anilin und Soda Fabrik, Ludwigshafen. Eng. Pat. 20,553, Oct. 14, 1901.

SEE Fr. Pat. 315,573; this Journal, 1902, 544.—T. A. L.

Nitroaliphylacyldiamidonaphtholsulphonic Acids, Nitroaliphylamidoacyldiamidonaphtholsulphonic Acids, Amidoaliphylacyldiamidonaphtholsulphonic Acids, or Amidoaliphylamidoacyldiamidonaphtholsulphonic Acids, and New Azo Colouring Matters derived therefrom; Manufacture of New —. O. Imray. From Soc. Chem. Ind. in Basle. Eng. Pat. 13,778, June 17, 1902.

NITROALPHYLACYLDIAMINONAPHTHOLSULPHONIC acids or nitroaliphylaminoacyldiaminonaphthol sulphonic acids are obtained by reacting with acid chlorides of nitroaliphyls (e.g., *m*-nitrobenzoyl chloride), nitroaliphylisocyanates and nitroaliphylisothiocyanates on aminonaphtholsulphonic acids. These compounds, on reduction, yield new aminoaliphylacyldiaminonaphtholsulphonic acids. The latter can also be obtained by hydrolysing the acetyl-aminoaliphylacyldiaminonaphtholsulphonic acids formed by reacting with the acid chlorides of acetylaminonaphthyls (e.g., acetaminobenzoyl chloride) on aminonaphtholsulphonic acids. The new aminoaliphylacyldiaminonaphtholsulphonic acids are useful as primary components for the preparation, by combination with diazo

compounds, of azo dyestuffs which can be diazotised and developed in bulk or on the fibre with amines and phenols, and differ from the original aminonaphtholsulphonic acids in giving diazo compounds, which, on treatment with alkalis, yield reddish-yellow to reddish-blue dyestuffs, and not violet to black dyestuffs. The nitro derivatives above mentioned combine in alkaline solution with diazo compounds to form azo dyestuffs suitable for the manufacture of lakes. Similar dyestuffs can be obtained by treating with nitro aliphyl chlorides the azo dyestuffs resulting from the combination of diazo compounds and aminonaphtholsulphonic acids. Dyestuffs containing an aminoaliphylacydyl or an aminoaliphylaminoacydyl radicle are also formed by hydrolysing the azo dyestuffs obtained from aromatic diazo compounds and acetylaminodialiphylaminonaphtholsulphonic acids. Further, the diazotised aminoaliphylacydyl- or aminoaliphylaminoacydyl-aminonaphtholsulphonic acids combine with amines or phenols, the resulting azo-dyestuffs combining in an alkaline medium with diazo compounds. The shades obtained, which are said to be very fast to washing, are also distinguished by their intensity and brilliance.—T. A. L.

Dyewoods, Sugar-Cane, Beets, Bagasse, and other Materials; Treatment of —, and Apparatus therefor. F. Kessler. Eng. Pat. 15,355, July 9, 1902.

See under XVI., page 1288.

UNITED STATES PATENTS.

Colour Scale. C. J. Jorgensen, Milwaukee, Wis., U.S.A. U.S. Pat. 709,328, Sept. 16, 1902.

THE patentee claims the construction of a colour chart containing a series of coloured figures arranged in a rational sequence. This is effected by taking the three primary colours, yellow, red, and blue, mixing them in pairs to form secondary colours, and mixing each of these with the primary colour which it does not contain or with any other secondary colour containing the omitted primary colour.

—T. A. L.

Toluylic Aldehyde, and Process of Making same; Orthosulphonated —. J. Koetschet, St. Fons. Assignor to Soc. Chim. des Usines du Rhône anc. Gilliard, P. Monnet et Cartier, Lyons. U.S. Pat. 709,159, Sept. 16, 1902.

By sulphonating *m*-toluic aldehyde with 60 per cent. oleum at a low temperature, the chief product is the *o*-monosulphonic acid $C_6H_4SO_3H$. Its sodium salt reacts with phosphorus pentachloride, giving a chloride melting at about $109^\circ C$. See Eng. Pat. 21,365 of 1900; this Journal, 1901, 1205.—T. A. L.

Green Dye [Triphenylmethane Dyestuffs], and Process of Making same. J. Koetschet, St. Fons. Assignor to the Soc. Chim. des Usines du Rhône, anc. Gilliard, P. Monnet, et Cartier, Lyons. U.S. Pat. 709,160, Sept. 16, 1902.

THE sulphonated *m*-toluic aldehyde described in the preceding specification is condensed with dimethylaniline to a leuco compound which on oxidation yields a bluish-green dyestuff fast to alkalis. In place of dimethylaniline may be employed diethylaniline, ethylbenzylaniline, methyl- or ethyltoluidine, or their substitution products, such as ethylbenzylaniline sulphonic acid, dibenzylsulphonic acid, toluidine-*p*-sulphonic acid, or naphthylamine sulphonic acid. See Eng. Pat. 21,365 of 1900; this Journal, 1901, 1205.

—T. A. L.

Blue Sulphur Dye [Sulphide Dyestuffs], and Process of Making same. R. Herz, Assignor to L. Cassella and Co., Frankfurt-on-the-Maine. U.S. Pat. 709,151, Sept. 16, 1902.

Para-amino-tolyl *p*-hydroxyphenylamine, obtained by the simultaneous oxidation of *p*-aminophenol and *o*-toluidine, is heated with sulphur and sodium sulphide to 80° – $120^\circ C$. The crude melt containing the leuco compound is dissolved in water, and the dyestuff is precipitated by a current of air. It dissolves in water in presence of sodium sulphide, and gives indigo-blue shades on unmordanted cotton. See Fr. Pat. 317,219; this Journal, 1902, 967.—T. A. L.

V.—PREPARING, BLEACHING, DYEING, PRINTING AND FINISHING TEXTILES, YARNS, AND FIBRES.

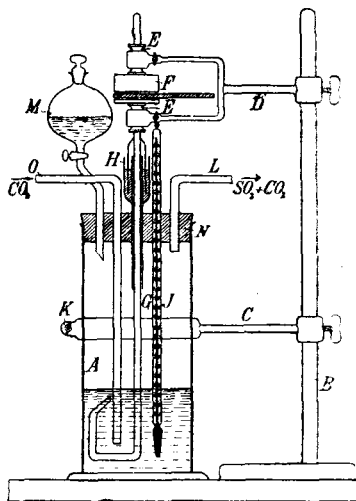
Silk; Weighting —, with Tin Compounds. H. Silbermann. Zeits. Farben- u. Textil-Chem., 1902, 1, [17], 464–465.

SILK weighted with stannic hydrate by the method formerly in common use is destructively affected by exposure to direct sunlight. When the weighting is accomplished by the Neuhaus method now generally practised, which consists in treating silk, in the form of yarn, successively with a solution of stannic chloride at 25° – $30^\circ B$, water, and phosphate and silicate of soda, the fibre is much less readily injured by light, provided that stannous salts are absent from the stannic solution employed. When such salts have been present in this, the weighted silk suffers a deterioration in tenacity, slowly in the dark, more rapidly in the light. To detect the compound, resulting from the application of stannous salts, a sample of the yarn is heated with an acidified solution of mercuric chloride, when, if stannous tin be present, mercurous chloride deposits upon the yarn and, after washing, may be converted into a more or less dark grey coloured compound by treatment with hydrogen sulphide.

A similar destructive action upon the fibre is caused by ferrous salts present in the ferric mordant employed in dyeing black upon silk.—E. B.

Turkey-red Oil, [Non-oxidising Action of Sulphuric Acid on Olive Oil]. W. Herbig. Färber-Zeit., 1902, 13, [18], 277–282.

WITH a view to determining the action of sulphuric acid upon olive oil, in the manufacture of Turkey-red oil, the sulphur dioxide generated during the treatment of olive oil with sulphuric acid was measured. The apparatus employed for this purpose consisted of a glass cylinder A (see figure) with an india-rubber stopper N, containing holes for a gas-inlet tube O for a current of carbon dioxide, a gas-exit tube L for the removal of this gas and the sulphur dioxide produced, a tap funnel M, thermometer J, and a stirring rod G driven by a turbine and working in



a mercury seal H. The oil experimented upon, namely pure olive oil, was placed in the cylinder and mixed with the acid which was allowed to drop into it, at various rates of speed, from the funnel. The results show:—

1. Little or no sulphur dioxide is evolved when the acid is added slowly and the mixture is cooled.

2. The rapid addition of acid causes sulphur dioxide to be disengaged. In an experiment in which the temperature of the acid-oil mixture rose from 17° to $41^\circ C$, 0.113 grm.



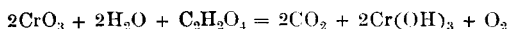
of sulphur dioxide was produced from 26.9 grms. (3 mols.) of acid and 100 grms. (1 mol.) of oil.

3. Sulphur dioxide is formed when the acid-oil mixture is allowed to stand for a long time.

4. As the quantity of sulphur dioxide produced, even under the unfavourable conditions mentioned above (2 and 3), is very small, the oxidising action of sulphuric acid on olive oil may be neglected when formulating the reactions which occur in the preparation of Turkey-red oil from this oil.—E. B.

Indigo Discharge Process; Function of Oxalic Acid in the Chromic Acid — W. G. Schaposchnikoff and W. Michireff. *Zeits. Farben- u. Textil-Chem.*, 1902, 1, [17], 459–464.

IN the mixed sulphuric and oxalic acid discharging bath employed in calico printing, the first phase of the action which occurs is between the potassium chromate, printed upon the indigo-dyed tissue, and the sulphuric acid in the bath, resulting in the formation of potassium sulphate and chromic acid. The next phase is the reaction between the latter of these and the oxalic acid, giving carbon dioxide, which escapes, chromic hydrate, which is dissolved by the excess of sulphuric acid, and active oxygen; thus—



the oxygen at the moment of its formation oxidising the indigo to isatin. The function of the oxalic acid is not, therefore, as is still, it would seem, generally assumed, a reducing one upon the chromic acid which is supposed to be dissolved from the tissue, but it is an oxidising one, and is much more important.

The authors have undertaken an exact experimental research upon the chromic acid discharge process with the object of elucidating:—

1. The effect upon the tenacity of the cotton fibre of the several operations of dyeing with indigo, treating with acid after dyeing, and treating with acid after printing.
2. The question whether the presence of oxalic acid in the discharging bath is essential.
3. Whether the oxalic acid reduces the destructive action upon the tissue which takes place.
4. Whether the reaction which occurs is correctly expressed by the above equation.

The present article deals with the first of these subjects.

Diminution in the Tenacity of Cotton Fibre caused by dyeing with Indigo.—Dynamometric tests show that the loss in tenacity suffered by cotton tissues in the operation of dyeing with indigo in a vat set with indigo pure (3 grms. per litre), powdered zinc (3.5 grms.), and lime (7.5 grms. of CaO), amounts to 9 per cent. A solution containing 10.7 grms. per litre of caustic soda, i.e., an amount equivalent to the lime present in the vat, caused under the same conditions of immersion and exposure to air, the treated tissue being finally dried without washing, a loss of 3.4 per cent. A blank experiment made with a solution of lime, containing lime in suspension, as in the vat, gave a loss of 5.7 per cent. Although alkalis thus reduce the tenacity of the tissue, an important factor in such action is obviously to be sought elsewhere.

In the souring operation following the dyeing with indigo, the diminution in tenacity caused by an immersion for $\frac{1}{2}$ –1 minute in a solution containing 35 grms. of sulphuric acid per litre, amounted in one experiment to 9.5 per cent.; in another experiment, in which the tissue was afterwards washed with water until Congo Red was no longer reddened, and was then rinsed in dilute ammonia, and again in water, before being dried, the loss was 10.7 per cent.—E. B.

Calico Printing; Method of Producing Naphthylamine Bordeaux in — E. C. Kayser. *Zeits. f. Farben- u. Textil-Chem.*, 1902, 1, [17], 466–467.

A SOLUTION of tannic acid, thickened with gum tragacanth, is printed upon an unprepared cotton tissue, along with the ordinary Alizarin and pigment colour mixtures, with the exception of those containing Ultramarine Blue. The tissue is steamed for an hour, or longer if necessary. It is then treated with tartar emetic, rinsed, soaped, and dyed in a

cold dilute solution of diazotised α -naphthylamine, until the yellow or yellow-brown tannic acid compound which is formed no longer darkens in shade. After being well rinsed in water, the tissue is treated with a cold solution of sodium β -naphtholate. A claret colour is thus obtained in the parts of the tissue where the tannic acid has been printed. Instead of naphthylamine and β -naphthol, certain other similar compounds may be employed, e.g. benzidine, tolidine, dianisidine, aminoazobenzene. The red colour produced with p -nitraniline and β -naphthol is too dull to be of technical value.—E. B.

ENGLISH PATENTS.

Carpet; Washable and Waterproof — W. Montgomery, Addlestone. Eng. Pat. 17,308, Aug. 29, 1901.

WATERPROOF fabrics for covering floors are manufactured by spreading upon felt, jute, canvas, &c., a mixture of boiled linseed oil, wood flour, "benzine," paint, and driers. To produce a smooth surface upon them, the fabrics are pressed between rollers. If a rough surface be desired, this operation is omitted, and flocks or similar materials are added to the waterproofing mixture. The fabrics may be printed upon in the usual manner.—E. B.

Textile Fabrics; Method of and Apparatus for Waterproofing — F. Rushworth, Bradford. Eng. Pat. 19,656, Oct. 2, 1901.

TENTILE fabrics are first "mordanted in the usual way," and are then passed over a supporting bed beneath and in contact with a rotating brush, to which the waterproofing agent, which is liquid when hot and solid when cold, is supplied in the former state, being evenly brushed into the prepared fabrics, while these are being drawn over the supporting bed. The fabrics are then shrunk by being placed in a moist and warm condition between layers of wet cloths, or by any other known method.—E. B.

Textile Fabrics or Yarns; Mordanting and Dyeing — [by Means of Viscose]. A. Fielding, Salford. Eng. Pat. 20,398, Oct. 12, 1901.

SEE U.S. Pat. 708,761; this Journal, 1902, 1230.—E. B.

UNITED STATES PATENT.

Silk; Process of Intensifying the Lustre of — C. Stuart, Paterson, N.J. U.S. Pat. 709,524, Sept. 23, 1902.

SKAINS of silk are taken in a damp state after dyeing and directly after treatment in a hydro-extractor, and are stretched and, at the same time turned, or turned and calendered, while they are subjected, in a closed chamber, to dry air at a temperature of about 120° F. The lustre of the fibre is thus enhanced, while its shrinkage is prevented.—E. B.

ERRATA.

This Journal, 1902, 1229, col. 2, l. 25 from bottom; also *ibid.*, 1230, col. 1, l. 10 from top, for "pyrosulphate" read "pyrosulphite."

This Journal, 1902, 1230, col. 2, l. 31 from bottom, for "to textile fabrics" read "for textile fabrics."

VI.—COLOURING WOOD, PAPER, LEATHER, Etc.

Mill Boards; Colouring — Black. *Papier-Zeit.*, 1902, 27, [77], 2777.

Method A.—Four kilos. of logwood extract and 2 kilos. of quercitron extract are dissolved with gentle boiling in 30 litres of water; 1–2 kilos. of good starch, suspended in 2.5–5 litres of cold water, are boiled to paste in the above mixture, 1 kilo. of glycerin and 8–10 kilos. of a casein solution (1:6) being then added. A first coating is given to the board with this solution. For the second coating, 7 kilos. of casein are dissolved in 42 litres of water with 700–800 grms. of ammonia (casein solution,



1:6); to this are then added, in the following order:—300 grms. of potassium bichromate, boiled in 3—4 litres of water; 150 grms. of copper sulphate, dissolved in 2 litres of water, with the addition of 1.5 litres of ammonia and, if necessary, 2 litres of glycerin. On the application of this, the dull first coat acquires a deep black, washable lustre.

Method B.—Sodium silicate, logwood paste, and shellac solution, with a little Marseilles soap, when mixed in suitable proportions give with one coating a black, which may be rendered more lustrous and washable by polishing, after drying, with a brush rubbed in paraffin wax.

Method C.—2 kilos. of shellac and 1 kilo. of logwood extract are steeped, in a closed vessel, with 2 litres of ammonia and 10 litres of water for 24 hours, and then dissolved at a moderate heat. Marseilles soap, 0.25—0.5 kilo., dissolved in water, is then added, together with sufficient potassium chromate solution to give the paste the proper shade of black (too much chromate decreases the lustre). The presence of shellac ensures the washing qualities of the colour.—J. F. B.

ENGLISH PATENT.

Wall Coverings; Washable, Embossed —. R. Völker, Buda Pesth. Eng. Pat. 22,461, Nov. 7, 1901.

A MOULD composed of, e.g., glue, plaster of Paris, or sulphur, and prepared from a model of the design to be reproduced, is filled with a plastic mixture of magnesium chloride, gypsum or chalk, asbestos, magnesite, and dextrin, to which pigments may be added if desired. A backing of paper, textile tissue, sheet zinc, or wood, is pressed upon the plastic mass, which is then allowed to harden. When the mass is completely set, the fabric produced is withdrawn from the mould, and is ready for use.—E. B.

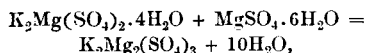
VII.—ACIDS, ALKALIS, AND SALTS.

Oceanic Salt Deposits; Formation of Langbeinite. J. H. van't Hoff, W. Meyerhoffer, and F. G. Cottrell. Preuss. Akad. Wiss. Berlin, Sitz. Ber., 1902, 15, 276—282.

SCHÖNITE, $K_2Mg(SO_4)_2 \cdot 6H_2O$, is converted into *leonite*, $K_2Mg(SO_4)_2 \cdot 4H_2O$, at $47.5^\circ C$. or $41^\circ C$., according as K_2SO_4 or $MgSO_4$ is present in excess. Further dehydration occurs at $72.5^\circ C$.; the product, however, is not *langbeinite*, $K_2Mg_2(SO_4)_3$, but a complex of the formula, $K_2Mg_2(SO_4)_5 \cdot 5H_2O$. The conversion of *leonite* into *langbeinite*, which latter occurs in the Stassfurt salt-beds, takes place, according to the equation:—



on heating in a sealed tube, the transition temperature being about $89^\circ C$. The formation of *langbeinite* from *leonite* and magnesium sulphate,—



takes place above $61^\circ C$. *Langbeinite* can be obtained from a solution saturated with K_2SO_4 and $MgSO_4$ at $85^\circ C$. or above, but a better method consists in adding magnesium chloride as a dehydrating agent, and subsequently extracting it with alcohol. The temperature of formation of *langbeinite* from *leonite*, which is lowered from 89° to $61^\circ C$. by the presence of magnesium sulphate, falls to $37^\circ C$. in a solution saturated with common salt, and this is probably the lowest temperature at which it can have been deposited in the Stassfurt beds.—A. S.

Ferrocyanide Manufacture at the Hague Gas-Works. J. Ruten. Het Gas; through J. Gas Lighting, 1902, 80, [2055], 879—882.

In the Bueb process for the recovery of cyanogen from coal-gas (see Eng. Pat. 9075, 1898; this Journal, 1899, 570; also this Journal, 1900, 999; 1902, 1026), the final products are a pressed cake containing the cyanogen in the form of insoluble ammonium ferrocyanide (this Journal, 1900, 999), and a lye containing ammonium sulphate. The

application of this process is not feasible in works in which concentrated "ammoniacal liquor" is produced, since all the ammonia combined as sulphate would have to be liberated by means of alkali, and the cost of producing the concentrated liquor would be greatly increased; also, great care is required in the working up of liquors containing high and varying proportions of ammonia.

In the author's process, which is in practical operation at the Hague Gas Works, the final products are concentrated "ammoniacal liquor," containing 15—20 per cent. of ammonia, chiefly combined as carbonate and sulphide; liquor ammonia containing about 25 per cent. of ammonia; and potassium ferrocyanide (99 per cent.). In carrying out the process, basic ferrous carbonate is prepared by mixing hot solutions of ferrous sulphate (1,320 lb.) and sodium carbonate (606 lb.), allowing to stand, and washing the precipitate with water, in the mixing vessel, till free from sulphates. The precipitate is then agitated with from 660 to 1,320 galls. of water, and from 660 to 1,320 lb. of potassium carbonate, and the mixture run into the cyanogen extraction apparatus. After the extraction of the cyanogen, the liquor is run into a settling vessel, the precipitate of iron sulphide, ammonium ferrocyanide, and Prussian blue allowed to deposit, and the clear lye containing 4—5 per cent. of ammonia, chiefly as sulphate and carbonate, treated in a special Feldmann ammonia extraction apparatus. The condensed vapours produce a concentrated ammoniacal liquor containing 15—20 per cent. of ammonia. In the residual liquor in the still, a small quantity of a precipitate containing cyanide is formed. This is separated by filtration, and the liquid is then concentrated and the potassium ferrocyanide crystallised out.

The precipitate containing iron sulphide, ammonium ferrocyanide, &c., after the clear liquid has been separated, is filter-pressed and distilled with caustic potash, the ammonia evolved being collected in distilled water for the production of liquor ammonia. The residue in the still is filter-pressed, potassium ferrocyanide recovered from the lye by crystallisation, and the press-cake, if the mass has not been too strongly oxidised, used over again for cyanogen extraction.—A. S.

Foul Gases evolved in the Sulphate of Ammonia Manufacture; Removal of Sulphuretted Hydrogen from —. [Hemingway's Process.] Chief Alkali Inspector's Thirty-eighth Annual Report, 1902. (See also this Journal, 1902, 1136.)

FURTHER experiments have been carried out in the Chief Inspector's laboratory on the reactions occurring in Hemingway's process for the removal of sulphuretted hydrogen from the foul gases evolved in the sulphate of ammonia manufacture by the use of sulphite of iron (see Thirty-seventh Annual Report, 1901, 20—21, and also this Journal, 1900, 442, Hemingway, Eng. Pat. 9432, 1899). Mr. Hemingway has more recently pointed out to the Chief Inspector that a statement (p. 21 of Thirty-seventh Annual Report) of what occurs in the laboratory experiments, indicating that "a material loss of sulphur takes place through formation of thiosulphate, the sulphur in which is lost as far as the process is concerned," is not applicable to what takes place on the working scale, where he has found that ferrous thiosulphate is quite as efficient as sulphite in absorbing sulphuretted hydrogen from the gaseous mixture ascending his purifying column. Experiments made by Mr. Linder in the Chief Inspector's laboratory proved the correctness of Hemingway's view. In the experiments, two theoretical hypotheses were followed and examined, broadly represented by the two equations given in this Journal, 1902, 1136. This resulted in the rejection of the first, viz., $FeS_2O_3 + 3H_2S = FeS + 4S + 3H_2O$, since the black precipitate produced by the action of sulphuretted hydrogen on ferrous thiosulphate solution, was quite insoluble in dilute hydrochloric acid, and yielded no H_2S with excess of the acid. The second equation, viz., $FeS_2O_3 + 3H_2S = FeS_2 + 3H_2O + 3S$, however, affords a full and adequate explanation, quantitative and qualitative, of the reactions taking place. It is pointed out that, "taking the sum of the reactions, starting with sulphite of iron and sulphuretted hydrogen, in such a tower as



Hemingway describes (*loc. cit.*), a mixture of ferrous sulphide and bisulphide with free sulphur might be expected as the insoluble products at the foot of the tower. These, if collected on a filter-bed of pyrites smalls, would give a mass rich in sulphur and therefore of use to the sulphuric acid maker, and the calcined ferric oxide in a state of fine division suitable for manipulation by the colour maker.—A. S.

Sulphur in Coal and Pyrites; Determination of —. A. Reitlinger.

See under XXIII., page 1298.

Ozone; Reactions and Preparation of —. C. Arnold and C. Mentzel.

See under XXIII., page 1297.

ENGLISH PATENTS.

Carbonate of Lime obtained in the Recovery of Sulphur from Alkali Waste, and commonly called "Chance Mud"; Utilisation of —. A. Mason, Chester. Eng. Pat. 21,314, Oct. 24, 1901.

THE waste carbonate of lime is pressed and moulded into blocks, which are ground with salt cake and coal, with water or milk of lime, and then formed into bricks, or dried in heaps, for making black ash.—E. S.

Cyanogen Group; Treating the Spent Gases resulting from the Manufacture of Sulphate of Ammonia, for the Recovery of the —. A. H. Godwin and F. A. Keil, Margate. Eng. Pat. 2456, Jan. 30, 1902.

THE gases are passed through a solution of an iron salt, such as iron chloride or sulphate, to which "a percentage of sodium or potassium hydrate or carbonate" has been added; the alkali ferrocyanide formed may be crystallised out, or Prussian blue may be produced by addition of a suitable ferric salt.—E. S.

Chlorates and Perchlorates; Electrolytical Manufacture of —. P. L. E. Lederlin. Eng. Pat. 14,387, June 25, 1902.

See under XI. A., page 1282.

UNITED STATES PATENTS.

Ammonia Generator. J. A. Young, Assignor to C. Doersch, Trustee, Nyack, New York. U.S. Pat. 709,846, Sept. 23, 1902.

THE generator, intended for the production of ammonia water for laundry purposes, &c., consists of a solid inner core of caustic soda or lime, contained loosely within an outer enveloping sphere of, preferably, ammonium carbonate, through which are channels to the inner space, nearly tangential to the spherical core, so that when the generator is placed in the water to be ammoniated, the rush outwards of the gas generated by the percolation of the water within may cause a rolling motion of the sphere. The apertures to the channels are covered by caps, which may be perforated as required. The generator receives two coats, "relatively insoluble," the inner of paraffin, and the outer coat of a preparation of gelatin and chromic acid, for instance.—E. S.

Magnesium Peroxide; Process of Making —. F. Elias, Berlin. U.S. Pat. 709,086, Sept. 16, 1902.

BARium peroxide, previously hydrated by prolonged trituration in water, is brought into a very fine state of division, then suspended in water, and treated with a magnesium salt, such as the chloride, the presence of a little hydrochloric acid being desirable. The magnesium peroxide is then filtered off, washed, and dried.—J. F. B.

Sodium Peroxide; Process of Compressing —. G. F. Jaubert, Paris. U.S. Pat. 709,490, Sept. 23, 1902.

SEE Eng. Pat. 17,461, 1900; this Journal, 1901, 43.

—J. F. B.

Cyanate of Potassium; Producing —. S. Zuck-schwerdt, Leopoldshall, Germany. U.S. Pat. 709,570, Sept. 23, 1902.

THE mixture of salts (potassium cyanate, cyanide, and carbonate) obtained from the synthetic cyanogen processes, is made into a mash with sufficient water to dissolve the potassium carbonate, at a temperature not exceeding 66° C., and the residual salts are treated with sufficient water to dissolve the cyanide, at a temperature between -18° and +5° C., potassium cyanate remaining practically undissolved.—E. S.

Chlorine Gas; Generator for —. T. Edwards, Sebastopol, Australia. U.S. Pat. 709,004, Sept. 16, 1902.

THE generator is a semi-cylindrical iron, lead-lined vessel, adapted to sustain considerable pressure, and mounted on trunnions, so as to be free to oscillate. The cover has a central opening surmounted by a dome, for admission of acid, and for the chlorine exit pipe, and other openings for charging and discharging, lead washers extending around their edges, with devices for closing.—E. S.

VIII.—GLASS, POTTERY, ENAMELS.

Stoneware [Pottery] Glaze; Formation of Sediment in —. M. Heim. Sprechsaal, 35, [35], 1337-1338.

THE frequent tendency to deposit sediment, exhibited by stoneware glaze, may occasionally be remedied by adding crude plastic clay, kaolin, white lead, or chalk to the mass previous to the final grinding, or by increasing the density or viscosity of the liquid portion of the glaze with gum, dextrin, syrup, milk, blood, borax, boric acid, or acetic acid. Cases are, however, known where the sediment becomes hard and cannot be redistributed without regrinding, the result of which treatment is to increase the tendency to harden. This effect of excessive grinding would seem to be due to a partial dissociation of the glaze constituents, with formation of basic silicates that are more or less soluble in water, and capable of setting hard in conjunction with other siliceous materials. That this is actually the case has been demonstrated by the author with a glaze frit, which, after grinding with water for 10 days, gave a decided alkaline reaction to test paper, whereas neither the original frit nor any of the materials, such as chalk, white lead, or minium, added in grinding, gave any such reaction. A volumetric determination of the alkalinity, performed with acid in presence of phenolphthalein as indicator, revealed the presence of 4.8 grms. of free alkali in 25 c.c. of glaze (frit : water = 1 : 1½); and this ground glaze set so hard in the mortar, within a short time, that the porcelain balls were fixed as though embedded in cement. On stirring up a portion of the sediment with water, it proved difficult to moisten, drawing out in long ropy threads; but on gradually neutralising the alkali with a free acid, the viscosity was proportionally reduced and finally disappeared.

This experiment indicates the remedy for the fault in question; namely, that the frit should not be ground longer than is necessary to obtain the proper degree of fineness. In regrinding the solidified deposit, a little hydrochloric or nitric acid (free from iron) should be added to the solid glaze, the proportion not exceeding half a litre of 30° B. acid per 100 kilos. The excess of acid is afterwards washed out by decantation, and the glaze will be fit for use. A simpler remedy for practical use, however, is to neutralise the alkali with a soluble salt of an alkaline earth, e.g. barium nitrate, which at the same time precipitates an insoluble silicate. On stirring up such a salt with the glaze, the sediment is quickly and completely dissipated.—C. S.

UNITED STATES PATENT.

Silvering Glass; Trough for —. C. Laval, Pittsburg, Penn. U.S. Pat. 709,336, Sept. 16, 1902.

THE trough, for use in the silvering of sheet glass, has an inclined bottom, and is provided with an impermeable lining and a contracted outlet.—J. W. H.



IX.—BUILDING MATERIALS, CLAYS, MORTARS, AND CEMENTS.

Damp Walls; Tar Coating for —. Moorman. Centr. - Bl. der Bauverwaltung; through the J. Gas Lighting, 1902, 80, [2053], 739.

THE wall is first scraped and brushed clean, and the joints cleared to a depth of about 0.4 in. Large-headed nails, about 2.3 ins. long, are then driven into the joints of the courses at intervals of about 4 ins., the head of the nail being 0.3 in. from the masonry. Two coats of hot tar are next applied, and finally, a coat of cement is laid on the tar in the ordinary manner, care being taken that the nails are covered well, to prevent them from rusting. The average cost is about 3s. 8d. per square yard.—A. S.

Lime Sandstone; Artificial —. J. Gas Lighting, 1902, 80, [2051], 622.

HOT sand is mixed with powdered quicklime, and a certain quantity of water added at a temperature a little below boiling point. The mixture is spread out in a closed vessel until the lime is completely slaked, and is then heated with superheated steam. The pulverulent mass obtained is, before moulding, treated with steam in a mixer, and then submitted to the action of gaseous hydrofluoric acid in the hardening apparatus. It is claimed that the artificial stone produced will withstand the effects of water, air, and fire.

—A. S.

Cements; Inspection and Testing of —. R. L. Humphrey. J. Franklin Inst., 1902, 43, [1], 23—42; [2], 93—99.

IN the conclusions drawn by the author from the results of his investigations, it is pointed out that the cement made in rotary kilns is a comparatively new article, the properties of which are not yet completely known. This cement hardens very rapidly, and develops great strength in a very short time, but it has been observed that there is a period in the hardening when the tensile strength falls off considerably, both in the case of neat cement and of sand mixtures, though to a lesser degree with the latter. The same falling-off does not occur in compression tests. The great strength quickly attained by cements made in rotary kilns is further increased during the early stages by the addition of sulphate of lime, and it is claimed that the period of apparent retrogression occurs when the effect of the sulphate is neutralised, and that the real strength, due to the formation of the silicates, still continues. The briquettes which show a loss of strength are perfectly sound and hard, and present no evidences of unsoundness or disintegration. The loss of tensile strength during hardening is probably due to crystallisation, and the reason the loss is greater with neat cement than with sand mixtures, is that the voids in sand mixtures enable the expansion, produced by the process of crystallisation, to take place with less injury to the adhesive qualities of the cement.

The author considers that the proper method for ascertaining the real strength of cement, especially at the end of a long period of time, is by compression tests. Tension tests should be used for the purpose of determining the relative value of shipments of cement, and should be confined to tests not extending over more than 28 days (see also this Journal, 1902, 831).—A. S.

Cement Analysis; Note on —. R. F. Young and B. F. Baker.

See under XXIII., page 1298.

ENGLISH PATENTS.

Drying Bricks, Pottery, Malt, Cores for Foundry Work, and the like; Floors for —. J. A. Mobberley, Stourbridge. Eng. Pat. 18,154, Sept. 11, 1901.

THE drying floor consists of a layer of steam pipes with inlet and outlet chambers.—J. W. H.

Mortar, Concrete, Artificial Stone, and the like; Compositions applicable as —. G. le Roy de Lenchères, Vierzon, France. Eng. Pat. 19,045, Sept. 24, 1901.

SEE U.S. Pat. 702,140, 1902; this Journal, 1902, 973.

—W. C. H.

Cement for Binding Pigments or other Pliant or Mouldable Substances; Manufacture of a Non-Hygroscopic Cohesive Medium or —. L. Grote, London. Eng. Pat. 20,889, Oct. 18, 1901.

THE precipitate obtained by adding a concentrated solution of zinc chloride to a solution of an alkali silicate of 40° B. is washed free from alkali salts, to render it non-hygroscopic, and is pressed. The mass is then stirred in a nearly boiling alkali silicate solution of 40° B., to which an equal volume of water has been added. The product is evaporated to expel the greater part of the water present, and is then available for the purposes of the invention.—E. S.

Kilns; Fireproof Lining or Facing Material for —; also applicable for other Purposes. H. H. Lake, London. From Portland Cement Fabrik Hemmoor and P. F. Valeur, both of Hemmoor, Germany. Eng. Pat. 21,616, Oct. 28, 1901.

PORTLAND cement clinkers, in place of broken stones, gravel, or coarse sand, are mixed with ground Portland cement, moistened with water, and stamped down in the interior of the kiln or the like, which is immediately heated or fired. The claims also include the manufacture of retorts, muffles, crucibles, and the like from this fireproof material.—W. C. H.

UNITED STATES PATENTS.

Wall Finish, and Process of Making same. G. W. Wodicka, St. Louis, Miss., U.S.A. U.S. Pat. 709,188, Sept. 16, 1902.

A LUSTRELESS non-peeling wall finish is claimed. 2,000 lb. of powdered marble are added to a solution of 4 lb. of gum tragacanth in 42 galls. of water. The mixture is dried and reduced to an impalpable powder. Finally, 20 lb. of alum and 80 lb. of glue are added.—J. W. H.

Carborundum Articles [Refractory Bricks, &c.], and Process of Making same. F. J. Tone, Assignor to the Carborundum Co., both of Niagara Falls, Pa. U.S. Pat. 709,808, Sept. 23, 1902.

AMORPHOUS boron carbide, or a mixture of it and the crude materials of which the carbide is made, is compressed into a coherent form and crystallised by subjection to intense heat, which converts it into a crystalline and porous carborundum.—G. H. R.

X.—METALLURGY.

Moisture in Lake Superior Iron Ores. N. P. Hulst. Eng. and Mining J., 1902, 74, [10], 302.

THE author points out that of the 20,589,393 tons of iron ore shipped from the Lake Superior region in 1901, 88 per cent. consisted of soft hematites, whilst about 46 per cent. contained 10 per cent. or more of moisture. A considerable saving of freight would be effected by drying ores containing such large proportions of moisture, and although it has been found not to be advantageous to remove all the moisture from soft hematite ores, prior to shipment, owing to the dust losses and inconveniences which would ensue in handling, yet 6 per cent. of moisture may be removed without detriment from all soft hematites containing 10 per cent. or more of moisture, where the physical structure of the ore shows a more or less coarse grain. The total cost, including interest and cost of installation, of removing such a proportion of the moisture is estimated at about 6 cents per ton, whilst the saving of freight with the ores in question would vary from 10.5 to 14.1 cents per ton.

—A. S.



Gold Precipitation by Zinc Dust. G. A. Packard. J. Chem. and Metall. Soc. of S. Africa, 1902, 3, [4], 34-35.

IN reply to the discussion on his paper (see this Journal, 1899, 922 and 1022), the author states that the zinc dust used contains about 90 per cent. of Zn and costs at present 5 dols. per cwt.; samples of American manufacture containing only 60 per cent. of Zn were not sufficiently pure. The amount used depends upon the ore, and is not proportionate to the amount of gold and silver present, but averages about $1\frac{1}{2}$ lb. per ounce of gold recovered. It is usual, after a clean-up, to add a quantity of zinc dust to the first tank-charge to be precipitated. At the Mercur mill, 30 lb. are thus used for a 30-ton charge, 20 lb. are added on the second, and from 5 to 10 lb. on each subsequent charge. The solutions are always drawn off about 8 ins. above the bottom of the tank, and a portion of the zinc remains therefore at the bottom; thus there is always an excess of zinc in subsequent charges, although less is then actually added. This practice leads to economy in zinc consumption. The cubic contents of the vats used are probably six times as great as those of the zinc boxes used in the other (shavings) process to treat the same quantity of material. The dust process ensures a more complete precipitation in less time than is customary with the shavings process in the case of dilute solutions, but is not necessarily in all cases preferable.—W. G. M.

Gold Industry; Value of the Residual Products of the Dynamite Factory for the—. W. Cullen.

See under XXII., page 1296.

Aluminium; Alloys of —. L. Guillet. Bull. Soc. d'Encour. pour L'Ind. Nat., 1902, 101, [2], 221-273.

THE author's experiments were made with a view to isolate the compounds of various metals with aluminium, to study their properties and to ascertain what rôle they play in the constitution of the alloys. The results obtained are summarised as follows:—

The compounds isolated were:—

- (1) With tungsten, Al_3W and Al_3W in the form of crystals, and AlW_2 in the form of a crystalline powder insoluble in *aqua regia*.
- (2) With molybdenum, Al_3Mo , $AlMo$, and Al_2Mo in the form of crystals, and $AlMo_4$ as a crystalline powder.
- (3) With copper, the three compounds described by Le Chatelier, Al_2Cu , $AlCu$, and $AlCu_3$, the first-named in the form of prismatic crystals.
- (4) With tin, the two compounds, $AlSn$ (maximum of the fusibility curve) and Al_4Sn , both in the form of crystals.
- (5) With titanium, the two compounds, Al_3Ti_3 or $AlTi$, and Al_4Ti , the first in the form of lamellæ, the second as a crystalline powder.
- (6) With iron, the two compounds Fe_2Al_3 and $FeAl_3$ in the form of crystals.
- (7) With manganese, two compounds analogous to those of iron, Mn_2Al_3 and $MnAl_3$.
- (8) With uranium, the two compounds, U_2Al_3 and UAl_3 .
- (9) With chromium, Cr_3Al and $CrAl$.
- (10) With antimony, the compound $SbAl_{10}$ (one of the two maxima of the fusibility curve), which is interesting on account of its high melting point (about $950^\circ C.$), its specific gravity (2.7 at $20^\circ C.$), and its action on water (liberation of hydrogen and sometimes even formation of antimony hydride).
- (11) With nickel, the compounds Ni_3Al , Ni_4Al (?), Ni_2Al , and $NiAl_2$.
- (12) With cobalt, the compounds Co_3Al , Co_4Al (?), Co_2Al , and $CoAl_2$.

The author has also prepared $NiAl_6$ and $CoAl_6$ by fusing aluminium with nickel and cobalt respectively; other experiments appear to establish the existence of $FeAl$ and $MnAl$.

The accompanying diagram represents the fusibility curves determined by Le Chatelier, Roberts-Austen, Gauthier, Rolland-Gosselin, &c., and the author has indicated on them the various compounds isolated.

The mechanical properties of the alloys examined are given briefly as follows:—

(1) The aluminium tungsten alloys containing more than 58 per cent. of tungsten are very hard, but extremely brittle.

(2) Alloys of aluminium and molybdenum are very similar to the above; those containing the compound Al_2Mo rapidly disintegrate, owing to an allotropic transformation.

(3) Aluminium-tin alloys are malleable.

(4) Aluminium-uranium alloys, within the limits examined, are hard and brittle.

(5) Alloys containing more than 65 per cent. of iron and those containing 67 per cent. of manganese are malleable.

(6) Aluminium-chromium alloys containing more than 65 or less than 45 per cent. of chromium are hard and brittle.

(7) Aluminium-nickel alloys containing between 50 and 82 per cent. of nickel are very brittle and slowly disintegrate; those containing between 80 and 95 per cent. of nickel are extremely hard, the maximum degree of hardness being attained with 83 per cent. of nickel.

(8) Aluminium-cobalt alloys containing between 42 and 83 per cent. of cobalt are brittle; those containing between 83 and 98 per cent. are remarkably hard, the maximum degree of hardness being obtained with 87 per cent. of cobalt.—A. S.

Iron; Analysis of —. F. Bischoff.

See under XXIII., page 1299.

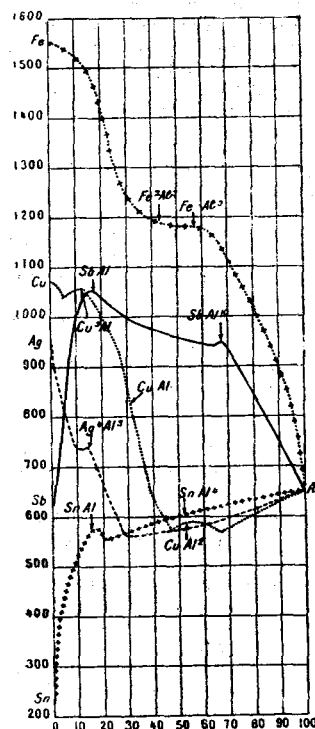
ENGLISH PATENTS.

Steel; Improved Method of Annealing —. R. A. Hadfield, Sheffield. Eng. Pat. 16,131, Aug. 10, 1901.

The steel articles are heated to an appropriate temperature, then allowed to cool considerably, and afterwards raised to a suitable, but lower, temperature than at first; and, lastly, the furnace is allowed to cool down slowly until the articles are cool enough to admit of handling. In the case of steel articles containing about 0.80 per cent. of carbon, these are first heated to between 850° and $1100^\circ C.$; allowed to cool to between 400° and $500^\circ C.$; then heated to from 760° to $820^\circ C.$; when the furnace is allowed to cool slowly as described.—E. S.

Steel; Manufacture of —. R. A. Hadfield, Sheffield. Eng. Pat. 16,132, Aug. 10, 1901.

An improvement on Eng. Pat. 27,753, 1897 (this Journal, 1899, 49), in which the manufacture of a chromium-nickel steel, free from or low in manganese, is described. According to the present invention, the proportion of carbon may vary from 0.2 per cent. upwards, but must be always kept below 0.6 per cent.—E. S.



Gold and Precious Metals; Extraction of —, from *Refractory Ores*. W. L. Wise, London. From R. McKnight, Philadelphia, U.S.A. Eng. Pat. 22,549, Nov. 8, 1901.

SEE U.S. Pat. 696,469, 1902; this Journal, 1902, 619.
—E. S.

Zinc, Cadmium, or Antimony; Smelting or Refining —. J. Armstrong, London. Eng. Pat. 11,339, June 3, 1901.

AN improvement on Eng. Pat. 3462, 1900 (this Journal, 1901, 367), chiefly in respect to the collection of the zinc fumes, which, instead of being passed into a bath of molten zinc, are collected as dust in an atmosphere of carbon monoxide proceeding from the furnace. The gases carrying the metal vapour (zinc, cadmium, or antimony), after passing through a column of incandescent fuel, are conveyed through cooled pipes to a closed condenser, a heavy oil, or the like, being employed to trap any metallic dust, as the gases (chiefly CO) leave the condenser to be stored for further use. The metallic dust is compressed into blocks, which, mixed with carbon, are subjected to distillation, the vapour being received in a bath of the liquid metal in the manner prescribed in the previously-named invention.

—E. S.

Zinc Ores; Reduction of —. L. Braunfels, Frankfurt-on-the-Maine, Germany. Eng. Pat. 17,415, Aug. 30, 1901.

THE ores, after previous roasting if containing sulphides, are powdered, mixed with coal dust, and formed into briquettes, which are heated sufficiently to expel tarry matters. They are then heated in an iron reduction vessel, having a condenser and suitable connections, to a sufficiently high temperature to distil the zinc, a vacuum being induced; and finally a current of an inert gas, such as carbon monoxide, is passed through to lead the zinc vapour to the condenser.—E. S.

Drying Bricks, Pottery, Malt, Cores for Foundry Work, and the like; Floors for —. J. A. Mobberley, Stourbridge. Eng. Pat. 18,154, Sept. 11, 1901.

See under IX., page 1279.

Metals; Improved Method of Eliminating — from *Mixtures of Metals*. A. J. Boulton, London. From the Ajax Metal Company, Philadelphia, U.S.A. Eng. Pat. 17,325, Aug. 6, 1902.

SEE U.S. Pat. 707,551, 1902; this Journal, 1902, 1185.
—E. S.

UNITED STATES PATENTS.

Iron; Process of Producing —. O. Thiel, Kaiserslautern, Germany. U.S. Pat. 709,563, Sept. 23, 1902.

THE process consists in "heating a regenerative furnace by the introduction of heated reducing gas; adding part of the flux to be employed and heating same; shutting off the gas supply and adding the charge of ore, carbon, and the remainder of the flux; readmitting the gas and then cutting it off to allow of an equalisation of the temperature of the apparatus; then readmitting the gas until the desired degree of reduction is obtained; and afterwards adding molten iron to take up the reduced iron."—E. S.

Ores and By-Products containing Sulphur and Iron; Process of Treating —. A. W. Chase, Avoca, Iowa. U.S. Pat. 709,745, Sept. 23, 1902.

THE process relates mainly to the treatment of sulphide iron ores, containing earthy ingredients, with copper and other metals; and also to the ashes of sulphide ores occurring as a by-product of the sulphuric acid manufacture. The ore is first roasted for the production of sulphuric acid, and the powdered ash is mixed with a small proportion of carbonaceous material; the mixture is then roasted at a full-red heat, with mechanical stirring and free access of air. To the mass, after powdering, if necessary, sodium chloride is added, in proportion "chemically equivalent to the copper present," and the mixture is roasted at a dull-

red heat. The product is lixiviated by hot water and steam under pressure, and the liquor and residue are respectively treated for their valuable constituents, the iron contained in the latter being one of these.—E. S.

Telluride Gold Ores; Treatment of —. W. Pethybridge, London. U.S. Pat. 709,037, Sept. 16, 1902.

SEE Eng. Pat. 1738, 1901; this Journal, 1902, 123.—E. S.

Telluride Gold Ores; Process of Treating —. W. Pethybridge, London. U.S. Pat. 709,038, Sept. 16, 1902.

SEE Eng. Pat. 4375, 1901; this Journal, 1902, 350.—E. S.

Nickel; Process of Melting —. H. L. Haas, Assignor to Zucker and Levett and Loeb Company, both of New York. U.S. Pat. 709,218, Sept. 16, 1902.

THE nickel to be melted and refined is mixed with "fuel," and charged in successive portions into a cupola furnace already containing strongly ignited "fuel," through which, and through the entire column of nickel and "fuel," air in large quantity and under "excessive pressure" is passed upwardly, so as to melt the nickel and oxidise any carbon it may contain or take up. The mixture of "fuel" and granular nickel is so fed in as to give practically a continuity of melted nickel flowing from the bottom of the column. The nickel thus melted and refined is stated to be especially suitable for anodes.—E. S.

Nickel and Copper-Nickel Ores; Treatment of —. C. Perron, Rome. U.S. Pat. 709,277, Sept. 16, 1902.

POOR nickel or copper-nickel ores, such as occur in serpentine in the Italian Alps, are finely powdered, and stirred with a solution of an alkali sulphide, or ammonium sulphide, with or without free ammonia. The liquor is collected, the residue washed with cold water, and the nickel reduced "by means of hydrogen sulphide."—E. S.

Alloy. D. P. James, Eureka, Ill., U.S.A. U.S. Pat. 709,268, Sept. 16, 1902.

THE alloy, intended to serve as a substitute for gold, is formed by fusing together approximately 72 parts of copper, 9 parts of tin, 4 parts of nickel, 2 parts of silver, and 1 part of aluminium, all by weight.—E. S.

Alloys of the Alkali Metals; Manufacture of —. G. F. Jaubert, Paris. U.S. Pat. 709,489, Sept. 23, 1902.

A Mixture of 4 parts of potassium with 1 part of sodium hydroxide is heated to between 200° and 300° C. on an oil-bath *in vacuo*; on cooling, a liquid alloy, having approximately the composition NaK₂, is found floating on the top of the melt. According to a second example, 5 parts of sodium may be similarly heated with 8 parts of potassium hydroxide, the fluid alloy obtained being approximately NaK. The invention is not confined to the use of the described proportions. The alloys are stated to react in many cases in which sodium is inert.—E. S.

Sulphide Ores; Eliminating the Sulphur from —. A. Gutensohn, Assignor to Sulphur Elimination Syndicate, Limited, London. U.S. Pat. 709,482, Sept. 23, 1902.

SEE Eng. Pat. 13,263, 1900; this Journal, 1901, 722.—E. S.

XI.—ELECTRO-CHEMISTRY AND ELECTRO-METALLURGY.

(A).—ELECTRO-CHEMISTRY.

Lead; Behaviour of — as *Anode in Sodium Hydroxide Solutions; and the Electrolysis of Sodium Hydroxide Solutions containing Lead*. K. Elbs and J. Forssell. Zeits. f. Elektrochem., 1902, 8, [40], 760—772.

THE following are the principal conclusions arrived at. A lead anode under all conditions dissolves in caustic soda



solutions as a di-valent metal. When solutions of caustic soda containing lead are electrolysed with insoluble anodes, lead oxide and oxygen are primarily deposited at the anode, but the peroxide is formed by secondary action. The yield of peroxide in relation to the current increases with the temperature and the rapidity of formation of the peroxide is dependent upon the material of the anode. The discharged anions have for the most part the formula HPbO_2 . Lead peroxide is formed on a platinum anode at 20°C . at a P.D. which is 0.23 volt lower than that necessary for the formation of lead oxide and oxygen; and the latter kind of discharge takes place at the same P.D. as that of another oxygen acid (HPbO_2) on platinum. Lead peroxide has, like platinum and some other metals, the property of occluding oxygen, and it is probable that, at a given potential, the pressure of the occluded oxygen is the same as it is on platinum. The potential of the system $\text{Pb}, \text{PbO}_2 \mid \text{normal NaOH}, \text{PbO}$ is about 0.3 volt lower than that corresponding to the formation of PbO_2 . Consequently the formation of lead peroxide and the re-formation of di-valent lead ions in alkaline solution is not a reversible process.—W. G. M.

Cuprous and Cupric Ions. G. Bodländer and O. Storbeck. *Zeits. anorg. Chem.*, 1902, **31**, 1—42.

When cuprous chloride is exposed to the action of water, two reactions occur; the prevailing one results in the production of cupric chloride and metallic copper, whilst in the other, cuprous hydroxide and free hydrochloric acid are formed. The former reaction is retarded by the addition of increasing amounts of chlorides, so that in solutions, in which the concentration with regard to potassium chloride is more than 0.05 normal, cuprous chloride will dissolve without decomposition. In aqueous solutions, cuprous chloride is present partly ionised. Solutions containing potassium chloride at concentrations of 0.05 to 0.4 normal, dissolve cuprous chloride with formation of the compound KCuCl_2 ; in more concentrated chloride solutions, the compound K_2CuCl_3 is formed.—A. S.

Aromatic Nitro-Compounds; Influence of the Cathode Material on the Electrolytic Reduction of —. W. Löb. *Zeits. f. Elektrochem.*, 1902, **8**, [40], 778—779.

This is chiefly a summary of work that has been done by various workers in the field under review.—W. G. M.

ENGLISH PATENTS.

Insulating (Electric) and Acid-Proof Materials and for Manufacturing various Articles; Plastic Compositions applicable as —. R. Abrey, Tooting. Eng. Pat. 18,417, Sept. 14, 1901.

One-half part of molten manilla copal is added to 7 parts of molten asphalt; to this mixture in a closed vessel a mixture consisting of 5 parts of carnauba wax, 1 part of paraffin wax, and $\frac{1}{2}$ part of ceresin wax is added and thoroughly incorporated under a pressure of a pound or two to the square inch; the temperature is then allowed to fall to 300°F . and 1 part of stearic acid stirred in; 4 to 6 parts of loading material (asbestos, wood pulp, or peat fibre) are finally added, when the mixture becomes ready for moulding to shape to produce articles, such as battery cells, &c.

—J. W. H.

Insulating Composition for Electrical Purposes, and a Method of Applying the same. J. W. Sankey, Bilston, Staffordshire. Eng. Pat. 22,990, Nov. 14, 1901.

This consists of a mixture of powdered chalk, steatite, or whiting, with flour paste, or other adhesive liquid, of such a consistency that it can be sprayed on the surface to be insulated.—W. C. H.

Insulating Bodies; Electric —. H. J. Haddon, London. From the "Pyrisolith" Insulating Material Manufacturing Co., Ltd., Budapest. Eng. Pat. 10,083, May 1, 1902.

POWDERED brittle insulating material such as gypsum, lime, clay, mica, &c., is heated to 70° – 100°C . and bituminous material stirred in, in the proportion of 11—7 parts

to 89—93 parts by weight of powdered brittle material. The dry and loose powder formed is freed from lumps, heated to 140° – 180°C ., and compressed in suitable moulds.

—J. W. H.

Insulating Compositions for Metallic Surfaces or Wires. J. A. Heany, Philadelphia, U.S.A. Eng. Pat. 17,744, Aug. 12, 1902.

FIBROUS or flakey asbestos is united to the surface to be insulated by a paste of lime or its equivalent combined with a gelatinous or gummy solution. See U.S. Pats. 703,198, 703,200, and 703,201, 1902; this Journal, 1902, 979.

—W. C. H.

Electrical Batteries (Electrodes). [Hydride of Copper.] M. J. B. A. Colletas, Paris. Eng. Pat. 18,256, Sept. 12, 1901. (Under Internat. Conv., Feb. 12, 1901.)

For employment in primary or secondary batteries, the basis of which is a combination of hydride of copper, lead, and sulphuric acid, the electrode holders are formed of agglomerated retort carbon, or of any porous material which is electrically conductive, but is not attacked by sulphuric acid. The carbon for the cathode is preferably associated with arsenic, and the paste for the anode is formed by mixing red lead, or the like, with water containing gelatin, white of egg, dextrin, starch or vegetable gums. The electrodes are placed in an aqueous solution of copper strongly acidulated with sulphuric acid, and on the passage of a current the copper is deposited on the cathode in the form of copper hydride. When the accumulator is charged and the circuit closed, the sulphuric acid attacks the copper hydride, forms sulphate of copper, and liberates the hydrogen.—G. H. R.

Anodes; New Manufacture of Carbon —. [Soot Carbon.] C. F. Auer von Welsbach, Vienna. Eng. Pat. 19,468, Sept. 30, 1901.

FLAME soot in a finely porous condition is strongly compressed and rendered conductive by heating to incandescence, and it is stated that anodes, wherein the parts that are directly subjected to the action of the current are formed of this substance, are capable of resisting the action of chemical reagents, and of offering a large amount of surface to the exciter. They are specially suited for employment in the cerium accumulator described in Eng. Pat. 21,566, 1900; this Journal, 1902, 124.—G. H. R.

Secondary Batteries. [Active Material.] C. T. J. Oppermann, London. Eng. Pat. 21,362, Oct. 24, 1901.

LEAD oxide is mixed with Trinidad bitumen in solution in a hydrocarbon and formed into a workable paste by the addition of sufficient dilute sulphuric acid. It is claimed that the bitumen renders the material harder or more coherent, and also more permanently conductive.—G. H. R.

Chlorates and Perchlorates; Electrolytical Manufacture of —. [Hydrochloric Acid.] P. L. E. Lederlin, Chedde, France. Eng. Pat. 14,387, June 25, 1902. (Under Internat. Conv., Jan. 8, 1902.)

This method differs from those described in Eng. Pats. 17,320, 1901, and 14,386, 1902, and consists in the electrolysis of a solution of a corresponding chloride whilst maintaining the electrolyte during the whole time of the electrolysis in a non-alkaline state by means of dilute hydrochloric acid, the latter being added either periodically, or preferably continuously, so that the liquid may never contain free alkali.—G. H. R.

Gases (NO_2 and NO , &c.); Process and Apparatus for Subjecting — to High Tension Electrical Discharges. [Electric Arc.] B. J. B. Mills, London. From the Atmospheric Products Co., New York. Eng. Pat. 14,781, July 2, 1902.

This patent relates to improvements in the process and apparatus described in Eng. Pat. 8239, 1901 (this Journal,



1901, 726), in which direct currents were used, whereas in this case uni-directional or alternating currents of any convenient frequency may be employed. Two sets of relatively fixed and movable electrodes enclosed in a chamber are used, the movable ones being mounted on a shaft connected with a driving device by an insulating coupling consisting of two discs of insulating material fastened respectively to the shaft and driving device and to each other, and an interposed insulating disc. The electrodes are provided with fine wire tips, those of the movable ones being finer than the others, and the fixed electrodes, which are adjustably mounted on insulating supports in the walls of the chamber, are normal to the plane of rotation of the movable ones, which are radially disposed. Gas inlets are arranged at the ends of the chamber near the shaft to direct the entering gas against it, and gas outlet ducts, placed in the periphery of the chamber, and extend throughout its length. The combination of gases to form oxides of nitrogen and their compounds is effected by separately charging their molecules electrostatically and leading them into a common chamber, where they are maintained at higher than atmospheric pressure and subjected to the action of the electric arc. Atmospheric air can be enriched by adding oxygen to it, and hydrogen in such proportions as to form a mixture containing less than 10 per cent. of hydrogen. The combined and uncombined gases are led away after treatment; the former are separated out, and the latter after having been restored to the original proportion by the addition of sufficient nitrogen and oxygen are again subjected to the electric arc.—G. H. R.

Electric Furnaces and the Production of Chemicals [Carbon Bisulphide] in such Furnaces. [Self-renewing Electrodes.] G. Brewer, London. From E. R. Taylor, New York. Eng. Pat. 16,556, July 25, 1902. (See also this Journal, 1902, 1236.)

THE furnaces and the process of producing chemicals in them are very similar to those described in Eng. Pat. 25,182, 1901; U.S. Pats. 702,117 and 706,128, 1902; this Journal, 1902, 353, 979, and 1143. Conduits formed of conductive material, and connected with a suitable generator of electricity, are arranged to discharge into

the working chamber of the furnace, and streams of fragmentary conductive material, adapted to constitute self-renewing electrodes, are fed into and through them to the bottom of the working chamber, and towards each other by gravity. Protective walls are arranged between the conduits respectively and the middle wall of the chamber. In the continuous production of carbon bisulphide, the sulphur or similar fusible material is introduced into the concentric spaces within the walls at the top, and fed from them respectively into the heat zone and at one or more levels above it. The bisulphide vapour is continuously discharged, and the residue from the carbon and sulphur is fused within the furnace, and periodically discharged from it in a fused condition.—G. H. R.

UNITED STATES PATENT.

Ozonising Apparatus. A. Vosmaer, Haarlem, Assignor to Company Ozon Maatschappij Systeem A. Vosmaer, Amsterdam. U.S. Pat. 709,427, Sept. 16, 1902.

See Eng. Pat. 5826, 1901; this Journal, 1902, 353.

—E. S.

(B).—ELECTRO-METALLURGY.

Aluminium Alloys, Electrical Conductivity of certain —, as affected by Exposure to London Atmosphere. E. Wilson. Paper read at the British Association, Section G, Belfast. Electrician, 1902, [1273], 868.

In a previous communication (see this Journal, 1902, 175) the physical properties of certain light aluminium alloys have been described. A specimen of each alloy in the form of wire, 0.126 in. (3.2 mm.) diameter, supported on a wooden frame, was placed on the roof of King's College, London, on June 11, 1901. These specimens were tested after about 13 months' exposure, and the results, with regard to electrical conductivity, are shown in the accompanying table.

The position of aluminium in the electro-chemical series with respect to the other constituents of the alloys is as follows:—Al, Mn, Zn, Fe, Ni, Cu, Si. It was thus to be expected that copper, widely separated from aluminium, would be effective in the production of corrosion, and this

No. of Specimen.	Analysis.						Specific Resistance in 10 ⁻⁶ ohms before Exposure on June 11, 1901.	Percentage Variation of Resistance as found on July 23, 1902.
	Si.	Fe.	Cu.	Ni.	Mn.	Zn.		
16	0.31	0.37	0.11	..	..	..	2.92	1.81
4	0.38	0.25	0.16	..	..	..	2.88	1.83
13	0.38	0.25	1.58	..	..	..	3.34	4.50
14	0.40	0.31	1.86	..	..	..	3.25	6.18
15	0.40	0.43	2.61	..	..	..	3.34	8.07
1	0.38	0.22	0.17	..	..	0.62	2.86	1.98
2	0.43	0.28	0.30	..	..	1.20	2.14	1.30
5	0.43	0.39	0.09	..	..	2.04	3.07	2.30
7	0.37	0.25	0.05	0.75	..	..	3.05	1.21
8	0.35	0.29	0.09	1.19	..	..	3.24	2.07
20	0.37	1.10	0.06	2.25	..	..	3.18	1.64
24	0.35	1.16	0.09	..	..	..	2.97	0.60
3	0.37	0.28	0.59	..	..	0.59	3.06	2.49
6	0.39	0.31	0.63	..	..	1.20	3.12	2.00
17	0.35	0.53	0.10	0.83	..	0.90	3.03	0.99
12	0.31	0.59	0.19	1.09	..	0.73	3.33	1.21
18	0.43	0.40	0.21	1.13	..	1.94	3.24	2.59
19	0.35	0.29	0.11	2.01	..	1.77	3.26	3.21
11	0.39	0.56	0.24	2.31	..	0.38	3.48	1.93
22	0.37	0.43	1.08	1.29	..	..	3.41	-1.41
21	0.30	2.57	0.10	1.39	..	..	3.24	-0.80
10	0.32	0.54	0.02	..	0.05	..	3.09	0.62
9	0.31	0.35	0.03	..	0.35	..	3.30	1.92
23	0.44	0.56	0.09	..	1.78	..	3.49	2.20

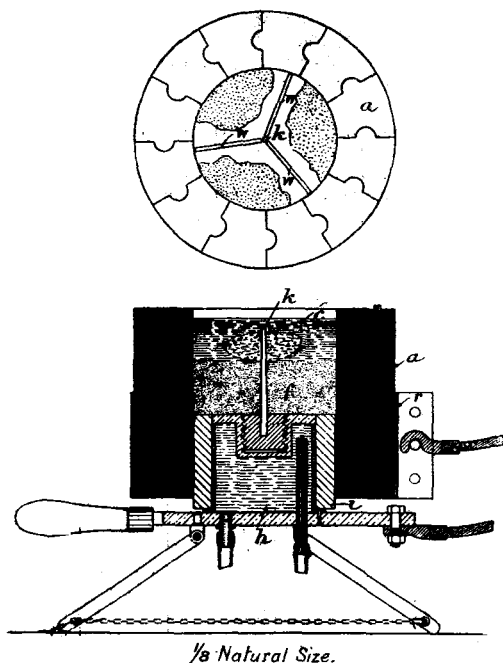


was found to be the case (specimens 16, 4, 13, 14, 15), the effect increasing with the percentage of copper. Nickel, which is well separated from aluminium in the series, had considerable effect alone (specimen 20), but when alloyed with copper (specimen 22), the conductivity increased slightly during exposure. This alloy (22) has a breaking load of 45,900 lb.; limit of elasticity, 36,600 lb. per square inch; percentage extension, 0.146 with 16,250 lb. per square inch; coefficient of expansion, 0.0000252; and temperature coefficient for electrical resistance, 0.00178 per 1°C . between 0° and 100°C . An alloy containing iron and nickel (21) had also a slightly increased conductivity; this specimen had a breaking load of 42,200 lb. per square inch, and a slightly higher conductivity than No. 22.

From the results it appears that in the preparation of light aluminium alloys which are to be exposed to the air, copper alone should not be used; with equal amounts (about 1 per cent.) of nickel and copper, the conductivity is reduced to a slight extent, but the gain in mechanical and corrosive properties is great.—A. S.

Calcium; Process for the Production of Metallic — W. Borchers and L. Stockem. Zeits. f. Elektrochem., 1902, 8, [40], 757–758.

A CIRCULAR vessel, consisting of a number of vertical carbon blocks shaped and keyed into one another, and held together by an iron band like the staves of a cask, is used to contain the charge, and also to act as anode. The bottom of the vessel is closed with a water-cooled box (see accompanying figure) separated from contact with the



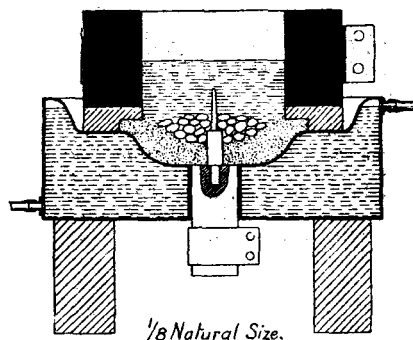
carbon by a refractory non-conducting material, such as clay. From this box a needle-shaped iron cathode projects upwards, to which connection is made through the supporting box. A layer of fluorspar is packed on the top of the cooled box to protect it from contact with the fluid charge. Calcium chloride is then placed on the working bottom of fluorspar, and is employed as electrolyte. The fusion of the charge may be started by connecting the top of the cathode with the anode by thin radial carbon rods (as shown in the "plan" of the furnace), which may be removed as soon as the upper portion is melted. A temperature at which the charge shows a red glow should be used, which is below the fusing point of calcium but above that of the chloride. With this arrangement, using a

relatively very small cathode surface, the calcium comes down in the form of a sponge-like mass, which can be removed by the aid of an iron spatula, and plunged into petroleum or other liquid free from oxygen. This sponge contains 50–60 per cent. of metallic calcium, and encloses much calcium chloride. By pressing the sponge together before removing it from the electrolytic vessel, it may be welded to a mass containing about 90 per cent. of calcium. Such a material may find many uses; but the remaining 10 per cent. of foreign substance may be removed by fusion with exclusion of air. After fusion of the calcium, a residual reddish salt has been observed, crystallising in the monoclinic or triclinic system, and evolving hydrogen, with formation of CaO and CaCl_2 , on exposure to moist air. It is evidently a subchloride of calcium, and contains chlorine in the proportion demanded by the formula CaCl . Calcium fluoride might be used as electrolyte, but the chloride is preferred. The apparatus is suitable for use on a large scale or for lecture purposes.

—W. G. M.

Strontium; Electrolytic Separation of Pure — W. Borchers and L. Stockem. Zeits. f. Elektrochem., 1902, 8, [40], 759.

THE apparatus employed by the authors for the production of calcium (see preceding abstract) could also be used to produce strontium; but this metal fused into shot, which sometimes rose to the top and sometimes sank (being evidently of nearly the same specific gravity as the electrolyte), and so gave rise to loss. The apparatus was there-



fore modified as shown in the annexed sketch. The water-cooled box was made much wider, and was shaped so that the point of the cathode was only just above the bottom of the anode. The carbons were insulated from the box by a fireclay ring. The layer of solid salt stamped into the bottom was thinner than before, with the result that the deposit solidified almost as soon as it formed. The pure strontium was therefore obtained in the form of shot measuring about 10 mm. in diameter. It is, like calcium, a white metal, and is as soft as lead.—W. G. M.

ENGLISH PATENT.

Ores and Refining of Metals, and Furnaces therefor; Electrical Smelting of — [Revolving Furnace.] E. Stassano, Rome. Eng. Pat. 8288, April 9, 1902.

IRON, chrome, manganese, or tin ores to be reduced are pulverised and mixed with pulverised reducing material (carbon) in the necessary chemical proportions to extract the oxygen or sulphur contained in them, and formed into a paste which is moulded into a block under pressure. The blocks are then reduced to small fragments and fused in a revolving electric furnace closed against the access of air, and "consisting of a cylinder surmounted by a cap revolving round an inclined axis, and resting by means of rollers on an inclined rail." The furnace is provided with carbon electrodes and holders with water circulation, hydraulic cylinders for the working of the carbons, brackets, tapping holes for the metal and slags, a charging hopper with

a double closing device, and cables for the transmission of the electric current, as well as means for the conduction of the water into the casings of the carbon holders and the hydraulic cylinders. Arms provided with metallic brushes are fixed on the top of the cap for the circuit of the electric current, and conducting cables communicate with the electrodes. A tube, not subject to the rotation of the furnace, is immersed in a trough filled with sand, and is supplied with metallic discs (insulated from the tube, and communicating with the poles of the current) on which the brushes are allowed to slide. A disc is fixed on the bottom of the furnace, and has fixed annular grooves with a disc, which hermetically closes it, and is fixed to the pivot of the furnace. The grooves communicate with the main water pipe, and the covering disc is provided with six water pipes, two of which communicate with the outside groove of the bottom disc and with the casings of the carbon holders, and the other four with the ends of the chambers of the hydraulic cylinders. Raw metals are refined by introducing with them into the furnace a certain quantity of the oxide of the same metal, so that the oxygen in the oxide may burn out the impurities of the metallic mass; or, in the case of other metals than those of the iron group, an excess of the same oxide is employed, and at the end of the reaction the quantity of carbon requisite to reduce any dissolved oxide in the liquid mass is added.—G. H. R.

UNITED STATES PATENT.

Ores; Electrolytically treating —. [Wet Method.] C. E. Dolbear, Assignor to American Mining and Metal Extraction Co., both of Boston, Mass. U.S. Pat. 709,817, Sept. 23, 1902.

METALLIC copper or other metals are produced from raw ores by crushing and dissolving the latter in a solution of a nitrate of a suitable metal, or of a compound containing a nitric acid radicle, adding sulphuric acid to the mixture, and subjecting the solution to the action of the electric current.—G. H. R.

XII.—FATS, OILS, & SOAP.

Fatty Oils; The Recognition and the Formation of —, especially in the Olive. C. Hartwich and W. Uhlmann. Arch. der Pharm., 240, [6], 450–470.

THE authors review the various reagents used for identifying oil in microscopic sections and recommend for this purpose a saturated solution of caustic potash mixed with an equal volume of ammonia solution. A drop of this solution is placed upon the section and then a cover glass is placed in position. After a time, the potassium salts of the fatty acids present, crystallise out. The authors claim their ability to distinguish between drying and non-drying oils by the shape of the crystals obtained.

Gentian root has been said to contain 6 per cent of fatty oil. The authors obtained 5.67 per cent. of a dark yellow sticky body which was not saponified by aqueous alkali, and which Hesse's, Liebermann's, and Salkowski's tests indicate to be a cholesterol-like fat. The authors have carefully examined the development of the oil in the olive; oil is present in a very early stage and gradually increases, until a maximum is obtained in January; after that the amount somewhat diminishes. The oil is not secreted in special oil cells, but occurs as drops in the protoplasm. It has been stated that the oil is formed from mannitol, but the authors were unable to find any mannitol in olives; they, however, found an abundance of glucose which they consider to be the source of the oil, since in the early stages an abundance is present, but later, when much oil has been formed, the quantity is small.—J. O. B.

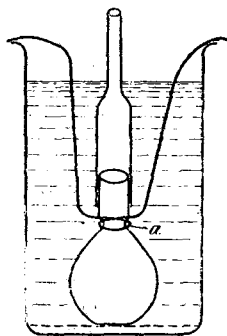
Linseed Oil. S. Fokin. J. russ. phys.-chem. Ges., 34, 501–503. Chem. Centr., 1902, 2, [8], 601.

ACCORDING to the author, linseed oil contains linolic acid, 22–25 per cent. of linolenic acid and 5 per cent. of solid fatty acids. Hazura has stated that it contains only linolenic and isolinolenic acids, whilst A. Reformatski could

only detect linolic acid. The linolic acid from linseed oil appears to be isomeric with the analogous acid from cottonseed and sunflower oils. The tetrabromostearic acid obtained on brominating linseed oil forms an amorphous mass melting at 98°–101° C.; that from cottonseed and sunflower oils is distinctly crystalline and melts at 114°–115° C.—A. S.

Wax; Determination of the Specific Gravity of —. H. Mastbaum. Zeits. angew. Chem., 1902, 15, [37], 929–931.

To determine the specific gravity of a wax at 100° C., the modified specific gravity bottle shown in the illustration is used. The bottle has its neck contracted at *a*, so that it may be readily suspended by a wire loop, and is fitted with the covering-tube to prevent any drops of the boiling water from falling into the wax. A piece of wire gauze, placed on the bottom of the beaker, protects the latter from shocks. After the bottle, filled with molten wax, has remained 15 or 30 minutes in the boiling water, it is raised so that its neck is just out of the water, the covering-tube is removed, and the previously warmed capillary stopper is inserted.—H. B.



ENGLISH PATENT.

Yeast and Spirit; Utilisation of certain Materials [Oil-cake and Leguminous Seeds] in the Manufacture of —. C. Stang. Eng. Pat. 14,852, July 3, 1902.

See under XVII., page 1290.

UNITED STATES PATENT.

Garbage [for Oil]; Apparatus for Cooking —. C. S. Wheelwright, Bristol, Rhode Island, U.S.A. U.S. Pat. 709,836, Sept. 23, 1902.

THIS apparatus, which is intended for removal of oil or grease from garbage, consists of a digester heated by means of a central steam-tight cylinder, and provided with pipes for the introduction of live steam and of a current of hot water to convey the oil to separating tanks.—C. A. M.

XIII.—PIGMENTS, PAINTS; RESINS, VARNISHES; INDIA-RUBBER, Etc.

(A.)—PIGMENTS, PAINTS.

ENGLISH PATENTS.

Anticorrosion Paint; An Improved —. J. F. Allen, Manchester, and R. G. Brooke, Upton, Chester. Eng. Pat. 24,370, Nov. 30, 1901.

A MIXTURE of sulphur, linseed oil, and turpentine, with or without terebene or other suitable ingredient for promoting the drying.—M. J. S.

Lead Pigments and Lead or other Metallic Compounds; Manufacture of —, and Apparatus therefor; also suitable for Aërating or Saturating Liquids with Gases. A. C. J. Charlier, Glasgow. Eng. Pat. 5637, March 7, 1902.

THE process, patented in 1896 (Eng. Pat. 19,788; see this Journal, 1897, 812), is improved by admitting the gas at a pressure of 200 lb. per square inch. The claim embraces the vessel for the reaction, this being capable of rotation or oscillation, and being mounted with hollow journals for the admission of the gas.—M. J. S.



Sulphide of Zinc; Obtaining —, from Copper Slag containing Zinc and Barium. F. Brünjes, of the Chemische Fabrik Innerste-Thal, Langelsheim, Germany. Eng. Pat. 16,272, July 22, 1902.

THE powdered slag is treated with sufficient diluted hydrochloric acid to dissolve as chlorides the barium, calcium, and iron present. The zinc is obtained as sulphide, which is separated by filtration. The lye is treated for recovery of the barium chloride, &c. In the case of slag containing zinc as oxide with iron oxide, but free from barium and calcium sulphides, a sufficient addition of these is made to secure the formation of zinc sulphide.—E. S.

Pigments; Manufacture of — [Ferric Oxide stained with various Dyestuffs]. A. S. Ramage, Cleveland, Ohio, U.S.A. Eng. Pat. 16,337, July 22, 1902.

SEE U.S. Pat. 708,584, 1902; this Journal, 1902, 1238.
—M. J. S.

Ferrous Liquors; Process of Treating — [Pigment]. A. S. Ramage, Cleveland, Ohio, U.S.A. Eng. Pat. 16,338, July 22, 1902.

SEE U.S. Pat. 708,585, 1902; this Journal, 1902, 1235.
—E. S.

(B.)—RESINS, VARNISHES.

ENGLISH PATENT.

Floor Coverings, Wall Decorations, and the like; Waterproof Composition for the Manufacture of —. J. Thame, Hounslow. Eng. Pat. 15,621, Aug. 1, 1901.

THE material is composed of gum of the *Dyera Costulata* (vulg. fluvia, pontianak, Borneo-mort, or jelutong), 25 to 35 per cent.; soft cotton fibre waste, 10 to 15 per cent.; hardening substance, such as zinc oxide, 65 to 50 per cent. To increase the elasticity of the product, 1 to 10 per cent. of Acera flake or manga boria gum may be added, or alternatively, 5 to 50 per cent. of an oxidised or sulphurised oil, e.g., cotton-seed, linseed, nut, or China wood oil. It is claimed for the composition that all waste, trimmings, &c., can be worked up with fresh material, thus avoiding loss.

—F. H. L.

UNITED STATES PATENT.

Turpentine Still. J. T. Gilmer, Mobile, Ala., U.S.A. U.S. Pat. 709,315, Sept. 15, 1902.

THE apparatus claimed consists of a combination of a still with a gum-vat, the latter being a covered kettle in which the crude turpentine is submitted to a preliminary fusion and filtration before admitting it to the still. Both the gum-vat and still are surrounded with corrugated steam jackets, which being bolted to the walls of the vessels at all the points of contact, add materially to their rigidity. Each vessel is also heated internally by a special horizontal heater-rack or blanket. This is constructed of two parallel metal plates, having indentations which meet one another, and are connected by hollow bolts or thimbles which permit the passage of the melted gum. The space between the plates is supplied with steam. The gum is charged into a wire basket resting on the heater-rack in the gum-vat. Below this rack there is a filter formed of cotton-batting, or other porous material, sandwiched between wire screens.—M. J. S.

(C.)—INDIA-RUBBER, &c.

India-Rubber; Species of *Landolphia* yielding —, in the French Congo. A. Chevalier. Comptes Rend., 135, [13], 512—515.

THE "vegeto-lianas" of the dry plains of interior Africa, the vegetation on which is periodically burnt, are quite different from the lianas of the forests; their aerial stems and twigs become annual or biennial, whilst their subterranean growth is enormously developed. Accordingly, caoutchouc is obtained, from those species which yield it, not from the upper portions, but from the roots. Three species are mentioned by the author, *Carpodinus lanceolatus*, *Landolphia Tholloni*, and *L. humilis*. The first has been

described as a rubber-yielding plant, but erroneously, since it gives only resin. The other two yield caoutchouc, the second in greater quantity than the third.—J. T. D.

ENGLISH PATENT.

Vulcanising Rubber, Articles of Soft and Hard India-Rubber, or of Rubber Substitutes in any Combination with Fibres, Spinnings, Cloth and other Materials, Metals, Asbestos, Minerals, Wood, Cork, and the like; Process and Apparatus for —. W. W. Wittenberg, E. Brock, and E. Koch, Riga, Russia. Eng. Pat. 9623, April 25, 1902.

THE articles are subjected to heat and pressure in a vessel in which the vulcanising medium is continually circulated, the pressure giving rise to the formation of pores in the material.—F. H. L.

UNITED STATES PATENT.

Hydraulic Presses; Swinging Table for —. M. Wilkes, deceased. Administrators, A. Wilkes and S. E. Gallagher, Trenton, New Jersey, U.S.A. U.S. Pat. 709,285, Sept. 16, 1902.

THE columns of presses used for vulcanising rubber, &c., form axes on which the platens for supporting the moulds may be swung.—J. W. H.

XIV.—TANNING; LEATHER, GLUE, SIZE.

ENGLISH PATENTS.

Leather Manufacture and the Preservation and Curing of Skins; [Use of Titanium Salts in —]. M. C. Lamb, London, and P. Spence and Sons, Ltd., Manchester. Eng. Pat. 11,092, May 30, 1901.

HIDES, prepared as for ordinary tanning, are treated in the drum or paddle for 3—15 hours, with a solution of a titanium salt or compound, either alone, or in conjunction with preserving, tanning, or colouring substances. The goods are then washed, free acid is neutralised with a weak alkali, such as borax, and fat-liquoring, mordanting, and dyeing may be proceeded with.

Tanned or partially tanned hides may be similarly treated, grease, and in the former case a portion of the tanning agent, being first removed by washing in a weak alkali solution (washing soda).

Borax, glucose, dextrin, or sugar may also be added to the titanium bath, or again, chromium, aluminium, or iron salts, by which means a combination tannage is effected. In order to cure or preserve the hides, it is sufficient to merely brush the flesh side with the titanium liquor.—R. L. J.

Tanning of Hides and Skins. W. H. Philippi, Burgel-Offenbach o/M., Germany. Eng. Pat. 22,062, Nov. 1, 1901.

A TANNING liquor is prepared by dissolving wood-, lignite-, or coal-tar or a mixture of these tars (100 parts) in turpentine oil (72 parts), pine oil, phenol or its homologues (30 parts), or a mixture of such solvents. The hides are prepared as if for vegetable tanning, but the lime must be completely removed.—R. L. J.

UNITED STATES PATENT.

Cement; Adhesive — [Casein-Glue]. J. T. Slough, Woodstock, Canada. U.S. Pat. 709,651, Sept. 23, 1902.

AN adhesive cement is prepared by warming together casein 16 parts, alkali (preferably pure caustic soda) 0.5—1.5 parts, an infusible oxide free from acidity or alkalinity (preferably magnesium oxide) 2 parts, and water substantially 36 parts.—J. F. B.

XV.—MANURES, Etc.

Molasses; Manufacture of Spirit from — [Spent Residue as Fertiliser]. A. Wenck.

See under XVII., page 1289.



UNITED STATES PATENT.

Fertilisers; Process of Making —. B. Terne, Philadelphia, Penn. U.S. Pat. 709,185, Sept. 16, 1902.

A PHOSPHATE-CONTAINING substance is treated with sulphuric acid, and to the product a concentrated ammoniacal liquor is slowly added, the resulting fumes being drawn off; a current of dry heated air is then forced through, with agitation in both cases, and the mass is finally powdered.—E. S.

XVI.—SUGAR, STARCH, GUM, Etc.

Raw Sugar; Alkalinity of —. Zeits. Vereins deutsch. Zuckerind., 1902, 52, [558], 601—636.

In a discussion on the Herzfeld official method of determining alkalinity (see Herzfeld, Zeits. Ver. deutsch. Zuckerind., Sept. 1902), Stutzer proposes the use of litmus as the best indicator.

Köhler also mentioned the contradictory results obtained in testing sugars for alkalinity. He was of opinion that the determination of alkalinity should be given up.

Herberger regards the testing for invert sugar as preferable to determining the alkalinity. Phenolphthalein being an indicator which, on Glaser's classification, is sensitive to acids is unsuitable for the determination of alkalinity. It does not react with feeble bases; with dilute strong bases it is of low sensibility, so that on adding well-boiled water even, the red colour may be made to disappear. Moreover, the alkalinity in sugar products is not due to alkalis or lime or their carbonates, but to carbonates and bicarbonates of weak organic bases. The loss of alkalinity of stored sugar is in all probability due to the formation of bicarbonates to which phenolphthalein is not sensitive when the quantities are small.

The proposal of Lauterbach to boil the solution before testing is not to be recommended for fear of dissolving alkali from the dish.

The requisites in an indicator for sugar are: pronounced sensitiveness to even weak bases, sufficient sensitiveness to free acids, a relatively slight sensibility towards carbonic anhydride, sensibility in the presence of small quantities of neutral bodies, as ammonium salts, caramel, sugar, dextrin, &c., and a restricted tendency to hydrolytic changes.

Rosolic acid, neutralised with potash, in his opinion, answers these requirements best. One grm. of commercial rosolic acid is dissolved in 90 per cent. alcohol in a 500-c.c. flask, neutralised with decinormal potash to a faint purple, and made up to the mark with alcohol. One c.c. of the solution must turn yellow with a drop of $\frac{1}{100}$ normal acid. The reagent shows bicarbonate alkalinity with great sharpness qualitatively, as well as free acidity, and is applicable with dark sugars and syrups.

Pollak gave examples showing that sugars acid to phenolphthalein but alkaline to litmus formed invert sugar. He concludes that the determination of alkalinity is a necessity, and that phenolphthalein is the only suitable indicator; also that the different results are no reason for abandoning the conditions of sale which include this test.

Herzfeld pointed out the subtle nature of the test with phenolphthalein, and that the conditions must be strictly observed to obtain uniform results. The minimum quantity of reagent only is to be used; a continued fresh addition of two drops to a dark solution will ultimately give a pink colour and a misleading result.—L. J. de W.

Granulated Sugar; Theory of the Production of —, by the Steffen Process. K. Cerny. Zeits. Zuckerind. Böhmen, 26, [11], 681—693.

Assuming the Steffen separation station to be properly planned, and a sufficiency of dry lime and of cold water available, the regular working of the factory lies within certain definite limits dependent on local conditions. These limits form the constants and determine the rational production of granulated sugar.

As a basis of calculation, take 100 kilos. of massecuite of the following composition:—Pol., 88.5; water, 4.0; non-sugar, 7.5; quotient, 92.18. The yield of first product

will be 75 per cent., leaving 25 per cent. of mother syrup. The composition of the first product being, pol., 95.5; water, 1.7; non-sugar, 2.8; the syrup will contain sugar, 16.88; water, 2.73; non-sugar, 5.40; and its quotient will be 75.7.

In practice, 50 to 55 of granulated sugar will be recovered from 100 of massecuite, and therefore from the 75 of raw sugar. For the sake of brevity in the calculations, 50 of granulated, polarising 100, is assumed, and its moisture and non-sugar are left out of account as negligible. Deducting 50 of sugar from the first product, a syrup is left containing sugar, 21.62; moisture, 1.27; non-sugar, 2.10; quotient, 91.14. The 25 kilos. of syrup are a mixture of grain and mother syrup, and calculation gives 14.62 of grain, pol. 130, and 10.38 of mother syrup; quotient, 75.7.

From this the system follows, for properly working for the granulated product; any mixing of the chief product, grain, must be most carefully avoided. The adhering syrup, which is only separated with difficulty from the crystals by centrifugalising, and must be dissolved away by the aid of steam, is of better quality and must be kept separate; every drop which reaches the lower product is a loss in yield. The moment must be seized when the richer syrup, quotient 90, begins to flow from the centrifugal; this is determined by analysis, by the time and the colour; under otherwise uniform conditions these data remain approximately constant. The arrangement of the centrifugal must be such that the separation of the syrups may proceed smoothly and with certainty.

The 25 of syrup from the first product is separated into a medium syrup and final runnings. Steam is admitted to the centrifugal at the moment when the first product is ready, the steam acting so as to produce a running syrup of gradually increasing purity from 75.7 to 98. This running syrup is so distributed by judicious admixture, &c., that as large a volume as possible of final runnings, of an average quotient of purity of 93.0, is obtained. The general aim is to obtain as nearly as possible 17 of medium and 8 of final runnings.

The 25 of mother syrup from the original massecuite and the 17 of medium syrup are mixed, giving a quotient of 81.8. This is boiled for 36 hours in a Grosse vacuum pan to 5 per cent. of water, and yields 18.18 kilos. of a second product of quotient 94.4 and a syrup quotient 70.8. The latter passes to the separation process, and produces 14.80 of dry solids of quotient 94, and final runnings, 8 kilos., quotient 93. The sum of the three last yields is the constant on which the regulation of the manufacture depends. The quantity of the massecuite, increased by the addition of these three items, gives 71.35 of granulated product in the first complete cycle, and this increases each cycle until it becomes constant at the eighth cycle of operations, when it reaches 87.21 of granulated from 100 of original massecuite containing 88.5 of sugar.—L. J. de W.

[Sugar] Beetroot Chips; Pressing —, before Drying. Herzfeld. Zeits. Vereins deutsch. Zuckerind., 1902, 52, [558], 599—601.

When exhausted beetroot pulp from the diffusers is pressed till it contains 16 or 20 per cent. of dry solids by removing moisture before drying, it is a question whether the advantage gained is not more than compensated by the loss of nutritive matters in the press water.

Heitsch, in 1892, by pressing to 11 per cent. of dry substance, found that 10 to 11 per cent. of the solids were lost. Köhler, in 1902, gives results showing a loss of 4.5 per cent. on pressing to 10 per cent. The differences may be ascribed to imperfect exhaustion of the pulp in the diffusers, any residual juice being readily pressed out. Max Müller also found great losses.

The pulp was wrapped in sail-cloth to avoid mechanical losses, and treated in a hydraulic press. The chips were exhausted both with hot and cold water, and it was found that at whatever temperature they were pressed, the chips exhausted in cold water gave the better results. With exhaustion in the battery at a normal temperature, the pulp was found to press best at about 60° C.; if however, the chips had been over-heated in the battery, they invariably gave bad results on pressing. After pressing for ten



minutes at 100 atmospheres, a much smaller amount of dry solids was obtained than with eight minutes at 80 atmospheres, because in the former case the pulp was swollen by working hot. Working hot in the battery influences the loss in pressing more than the pressure used. Thus at the abnormal temperature of 95° to 100° C. and hot exhaustion, there was a loss of 11 per cent. of albumin; at the normal temperature of 65° to 80° C., and pressing to 14.9 per cent. of dry solids, the loss was only 2.9 per cent. Bearing these conditions in mind, it is advisable to press the pulp as strongly as possible, as any excessive loss in the press water need not be feared.—L. J. de W.

New Disaccharides; Synthesis of some —. E. Fischer and E. F. Armstrong.

See under XXIV., page 1302.

Sugars; Isomers of β -Naphthyl Hydrazones of the —. W. A. v. Ekenstein and C. A. Lobry de Bruyn.

See under XXIV., page 1302.

Sugars; Preparation of Osones from the Osazones of —. E. Fischer and E. F. Armstrong.

See under XXIV., page 1302.

Sugars; Isomeric Acetohalogen Derivatives of —, and the Synthesis of Glucosides. E. Fischer and E. F. Armstrong.

See under XXIV., page 1302.

Molasses; Manufacture of Spirit from —. A. Wenck.

See under XVII., page 1289.

Alcohol from Molasses; Manufacture of —. E. Bauer.

See under XVII., page 1290.

Soluble Starch by Means of Persulphates; Manufacture of —. Soc. Anon. "Trust Chimique," Lyons. Ger. Pat. 134,301, May 30, 1901. Zeits. angew. Chem., 1902, 15, [39], 1019.

100 KILOS. of starch are mixed with 3–5 kilos. of ammonium persulphate and 150 litres of cold water are added. The mixture is stirred and the nascent oxygen converts the starch entirely into the soluble modification after about 10 hours' treatment.—J. F. B.

ENGLISH PATENTS.

Sugar Juice; Purification of —. A. Nodon and J. Piettre, both of Paris. Eng. Pat. 1792, Jan. 22, 1902. (Under Internat. Conv., Aug. 7, 1901.)

AN electrolytic process for the defecation of sugar juice. Shallow tanks are used, arranged in series of five or six, and stepwise to facilitate circulation of the sugar juice. The electrodes are composed of an alloy of lead and antimony (Pb 80, Sb 20), and a number of them are suspended vertically in each tank. The sugar-juice is treated with milk of lime and manganese dioxide, circulated through the vats and electrolysed under a pressure of 5 volts per vat, and a current density of 1 ampère per sq. decim., the liquid being continuously agitated by a rotating paddle at the bottom of each vat. The total energy required is about 6 kilowatts per 10 hectolitres of juice. The juice is then carbonated twice, filtered, and evaporated as usual.

—H. T. P.

Sugar; Separation of —, from Syrup or Molasses of *Masseuite*, and especially of *After-Product Masseuite*. H. Claassen, Dormagen, Germany. Eng. Pat. 14,108, June 21, 1902.

THE process consists in delivering into the centrifugal along with the masseuite, a saturated or slightly under-saturated sugar solution, used either warm or cold, the "purity" of such solution being not higher than that of the mother syrup from the masseuite. That is, the mother syrup from previous operations may be employed.

—H. T. P.

Sugar Cane, Beets, Bagasse, Dye Woods, and other Materials; Treatment of —, and Apparatus therefor. F. Kessler, Berlin. Eng. Pat. 15,355, July 9, 1902.

SEE U.S. Pat., 706,669; this Journal, 1902, 1147.

—J. F. B.

Amylaceous Bodies; Method of Producing Soluble Products from —. A. Ashworth, Bury. Eng. Pat. 19,720, Oct. 3, 1901.

STARCH is converted into a soluble modification by the oxidising action of chlorates in presence of a mineral acid at a temperature of about 30° C., with or without the presence of a catalytic agent such as a vanadium or cupric salt.—J. F. B.

Dextrin [Achroo-dextrin] and Alcohol; Manufacture of —. G. Reynaud. Eng. Pat. 17,506, Aug. 8, 1902.

See under XVII., page 1290.

UNITED STATES PATENTS.

Sugar-refining Apparatus. J. Robin-Langlois, Paris. U.S. Pat. 705,869, July 29, 1902.

THE apparatus consists of a series of batteries, each comprising a melting pan, cooler, and centrifugal, the whole so located that the raw sugar in passing from first to last is dissolved, crystallised, and centrifuged successively in each battery, leaving the last one as pure white sugar. The dissolving liquid (plain water in the last battery) travels in the reverse direction.—H. T. P.

Liquids [Sugar]; Apparatus for Defecating. J. E. Hatton, Santo Domingo. U.S. Pat. 705,924, July 29, 1902.

A COMBINATION apparatus for defecating sugar juice in a continuous and automatic manner. It comprises one or more open heating pans, all fed with sugar juice from a common supply tank, where the juice is previously saturated with milk of lime. Each heater is steam-jacketed below, and fitted with a temperature regulator which governs the steam supply to the jacket. The heated defecated juice is drawn off automatically by a siphon, controlled by a valve and float inside the pan, and an outside tap which regulates the rate of flow. The end of the siphon dips into a conical cylinder resting on the bottom of the pan, and in such fashion as to separate, as much as possible, the sludge, a distinct outlet being provided for the latter. The sugar juice, collected in the first place in two reservoirs (used alternately), flows through a small measuring vessel into the supply tank before referred to, where it encounters and is mixed with milk of lime coming from a small tank, the supply being regulated by a gate-valve controlled by a float in the measuring vessel. This same float also actuates an automatic volume-registering apparatus. Constant level is maintained in the mixing vessel by a float and valve regulating the juice flow. The milk of lime is kept in agitation by an air blast, and is drawn from a larger vessel provided with a rotating stirrer.

—H. T. P.

Adhesive [Wheat-Gluten Washings from Starch Manufacture]. A. S. Hoyt, New York. U.S. Pat. 709,544, Sept. 23, 1902.

THE waters, resulting from the washing of wheat-gluten in the manufacture of starch and from which the commercial starch has been separated, are concentrated, cooked, and reduced to dryness, yielding a product soluble in cold water and consisting of a mixture of converted starch and albumin suitable for an adhesive.—J. F. B.

XVII.—BREWING, WINES, SPIRITS, Etc.

Prickly Pear [Opuntia vulgaris]; Alcoholic Fermentation of the Juice of —. C. Ulpiani and L. Sarcoli. J. de la Dist. Franc., 1902, 932, 180; through Zeits. Spiritusind., 1902, 25, [36], 391.

THE expressed juice of the prickly pear contains 12.8 per cent. of sugar, which consists of a mixture of glucose and



fructose. The authors have found in the fermenting juice a natural yeast, which occurs on the fruit, and to which they have given the name *S. opuntia*. This yeast does not ferment cane-sugar, maltose, raffinose, milk-sugar, or galactose, but only glucose and fructose. It only ferments very slowly, and even after a long time the proportion of alcohol is smaller than the theoretical quantity. For this reason the spontaneous fermentation of prickly pear juice is not practicable industrially, and a special yeast would be necessary. For sterilised juice this would present no difficulty, but in the ordinary juice, added yeast is speedily suppressed by *S. opuntia*. On account of the expense of sterilisation, it would be desirable to find a yeast which would be capable of producing alcohol rapidly in the presence of the natural yeast.—J. F. B.

Samsu. B. T. P. Barker. Paper read before the Botanical Section of the British Association, Belfast. Chem. and Druggist, 1902, 61, [1183], 550.

IN the preparation of *samsu*—a fermented drink of Eastern Asia—which is a variety of arrack, rice is boiled in water, and, after cooling, a powdered substance, obtained in the form of small, round, greyish cakes, the composition of which is kept secret, is added. When the fermentation induced by this addition has subsided, the liquor is distilled three times, the final product containing a high percentage of alcohol. In the greyish cakes, the author has identified a species of *Monascus* and a bacterium capable of fermenting glucose. The genus *Monascus* has hitherto been placed in the hemiasci on account of a supposed formation of spores in a sporangium, surrounded by an investment of hyphae; that isolated by the author is, however, stated to be a true ascomycete.—A. S.

Glycogen in Distillery Yeasts, Pressed Yeasts and Top-Fermentation Brewery Yeasts; The Occurrence of —. W. Henneberg. Zeits. Spiritusind., 1902, 25, [35–39], 378–379, 388–389, 398–399, 410–411, and 420–421.

THE author finds that only very dilute solutions of iodine (less than 0.1 per cent.) are desirable for the detection of glycogen in yeast, as in this case the protoplasm remains uncoloured. In the same culture some cells and many budding branches may be free from glycogen, whilst others give a strong reaction, this being an individual and hereditary peculiarity. The glycogen first appears in the form of a number of sharply separated points, which increase in size and gradually fill up the whole protoplasm or only a definite portion of it. Rarely, the glycogen can be observed without staining; it has been seen with a strongly refractive oily appearance. "Reserve" cells containing glycogen are never met with; cells containing glycogen in old cultures are always dead ones. In dead cells the glycogen remains dissolved in the aqueous cell-contents, and it only escapes through the cell walls very gradually.

Quiescent Yeast: (a) Freshly-pressed.—Distillery yeast, Race 2, is very rich in glycogen; Races 7 and 9 are generally poor. The secretion of glycogen appears to be a racial characteristic.

(b) *Stored Yeast*.—At low temperatures the glycogen decreases constantly, and disappears in from two to four weeks. It disappears first at the surface and later in the interior of the mass of yeast, the process depending on the access of air. The working power of the yeast does not decrease, and is quite independent of the presence of glycogen. The number of living cells, i.e., the permanence of the yeast, is also independent of the glycogen. At higher temperatures the disappearance of the glycogen is far more rapid (maximum rate at 37° C.); at 50° C. the yeast is soon killed, and the glycogen then persists for a longer time. Fresh yeast freely exposed to the air loses its glycogen in three hours at 22° C.; at all temperatures the disappearance is far more rapid than in the mass. Under water the disappearance of the glycogen is slow without aeration, but rapid with aeration, a corresponding quantity of carbon dioxide being produced.

Fermenting Yeast.—Glycogen is formed in notable quantities only when plenty of sugar is present; it disappears as soon as the sugar is reduced by attenuation, and soon reappears when more sugar is added. The glycogen

content is influenced by factors which influence the fermentation, such as temperature, aeration, concentration of the wort. In concentrated worts it appears later and disappears more slowly on aeration than in dilute worts; in pure sugar it appears earlier and lasts longer than when peptone is added; the presence of lactic acid restricts the formation of glycogen. The best way to obtain the maximum content of glycogen is to keep the yeast for 24 hours in a 20 per cent. solution of cane-sugar, maltose, or glucose; starch and dextrin give no glycogen. Potato mashes never give very much glycogen, but grain, maize and molasses mashes, and malt worts generally afford large quantities.

Some races of yeast, e.g., a milk-sugar yeast, never form any glycogen. Logos yeast, on the other hand, is extraordinarily rich. The re-formation of glycogen on fresh additions of sugar to exhausted worts only takes place up to a certain point, depending on the race. The influence of the alcohol upon the yeast is probably the cause of this. On the other hand, the addition of alcohol to the culture liquid before fermentation does not hinder the formation of glycogen.

Dead Cells.—Cells which die whilst glycogen is present retain the latter much longer than living cells. Chloroform and alcohol delay its disappearance. The disappearance of the glycogen is favoured by aeration and delayed by the presence of sugar; it disappears much more slowly at 50° C. than at 37° C. The glycogen in dead cells disappears more rapidly in distillery mashes than in worts, owing to the presence of diastase in the former.

In conclusion, it may be stated that glycogen is an indication of the presence of plenty of sugar; it appears to be of no special advantage to the yeast, and therefore hardly deserves the name of a reserve material.—J. F. B.

Molasses; Manufacture of Spirit from —. A. Wenck. Zeits. Spiritusind., 1902, 25, [40], 430–431.

IN the more important molasses distilleries of France, Belgium, and Austria, the employment of malt and grain has long been successfully practised, and the use of hydrofluoric acid has been discarded. The good results are based on the use of pure-cultivated wine yeast, acclimatised to molasses and continuously propagated in the distillery in pure yeast apparatus. As a yeast nutrient an extract of yeast as proposed by Bauer should give good results, but nutrient salts, such as potassium phosphate and ammonium phosphate, are cheaper and better. The cost of the yeast, including these salts, is estimated at about 4 Pfennige per 100 litres of alcohol.

Utilisation of the Spent Residues.—Incineration in the direct-fire furnaces is attended by many drawbacks, and owing to the increasing competition of the electrolytic process of manufacturing caustic potash, it more often shows a loss than a profit. In all new plants for the concentration of spent wash, triple or quadruple effects take the first place, and if all the parts be constructed of copper or cast-iron, no excessive depreciation occurs. The author gives tables showing the composition of molasses spent-wash in the dilute state and after concentration to 71 per cent. of solids, together with analyses of the ash and the organic matter. In burning the concentrated residues for black ash without recovery of nitrogen, good practical results have been obtained by steam-raising in low-pressure boilers. In Garner's furnace 25 per cent. of black ash is thus obtained, containing 45–46 per cent. of K_2CO_3 . Besemfelder's process for the production of black ash, with recovery of about 70 per cent. of the total nitrogen as ammonia, by destructive distillation has not been widely adopted owing to the complexity of the treatment. In the process of Bueb and Reichardt, at the Dessau refinery, about 70–75 per cent. of the nitrogen is recovered, partly in the form of cyanogen compounds and partly as ammonium sulphate. These processes, however, are not on a very satisfactory basis. The most hopeful utilisation of molasses residues appears to be as a fertiliser, without incineration. The Chilinite syndicate's process consists in treating the concentrated residues with crude sulphuric acid and neutralising with chalk. The fertiliser produced contains 3.8 per cent. of nitrogen, 12.8 per cent. of potash as K_2O , 27 per cent. of gypsum, 3 or 4 per cent. of moisture, and the rest



organic matter. In this way the whole of the nitrogen and potash are retained, mostly in the form of valuable potash salts of amino acids, and the process is simple and odourless.—J. F. B.

Molasses; Manufacture of Alcohol from —. E. Bauer. *Zeits. Spiritusind.*, 1902, **25**, [34], 368.

THE deficiency of molasses in yeast nutrients, renders necessary the use of more nitrogenous adjuncts, in the shape of raw grain or malt, from which a wort is prepared by acid or diastatic conversion. This wort is mixed in with the molasses; or the yeast is grown up separately in the wort, and afterwards added to the molasses solution. Apart from the extra plant and expenditure so introduced, these methods suffer from the radical defect that the yeast is cultivated in a medium (dextrose or maltose) differing from that obtaining in the principal fermentation (saccharose).

The author's process, patented in 1896, and since then adopted by a number of leading molasses distilleries, is free from these objections. It consists in the use of a yeast-food prepared from enzymatically liquefied brewers' yeast. This yeast-food is commercially obtainable ("Hefe-Extrakt") in Austro-Hungary, and forms a paste which remains sound for a long time. About 200 grms. of it are added to 1,000 litres of sterilised and slightly acidified molasses solution, which is then "pitched" as usual. It is claimed that good, healthy fermentations are so obtained, yielding a yeast crop of vigorous cells, rich in invertase, and free from bacteria.

For two years the yeast extract has been employed in a number of maize and potato distilleries with marked benefit, enabling a reduction to be made in the proportion of malted grain required in mashing. The process is the subject of Ger. Pat. 130,072, 1900.—H. T. P.

ENGLISH PATENTS.

Drying Bricks, Pottery, Malt, Cores for Foundry Work, and the like; Floors for —. J. A. Mobberley. Eng. Pat. 18,154, Sept. 11, 1901.

See under IX., page 1279.

Measuring and Filling Liquids [Bottling of Beer] into Jars or other Vessels; Apparatus for —. J. G. Crossman, Watford. Eng. Pat. 18,974, Sept. 23, 1901.

THE apparatus consists of two vessels mounted with their mouths on a central hub, upon which the two may be rotated; passages are provided so that while the lower vessel is being filled, the upper one is discharging its contents into the vessel placed to receive it.—J. W. H.

Yeast and Spirit; Utilisation of certain Materials [Oil Cake and Leguminous Seeds] in the Manufacture of —. C. Stang, Berlin. Eng. Pat. 14,852, July 3, 1902.

THE utilisation of highly albuminous materials, such as oil-cake and leguminous seeds, in the manufacture of yeast and spirits is rendered possible by digesting the malted nitrogenous raw materials, or the unmalted materials mixed with malt or malt-extract, in a slightly alkaline condition at a temperature of 50°–60° C. for four or five hours, to permit of the activity of the proteolytic enzyme. The product is then acidified and added to the ordinary mashes as a yeast-nutrient.—J. F. B.

Dextrin [Achroodextrin] and Alcohol; Manufacture of —. G. Reynaud, Paris. Eng. Pat. 17,506, Aug. 8, 1902.

PEAT, lichens, and mosses are mixed with twice their weight of water, and heated under pressure in an autoclave to a temperature of from 160° C. to 220° C. for about an hour and a half; the cellulose and starchy matters are thus converted into achroodextrin. If desirable, the water used may be slightly acidulated (2–3 per cent. of acid). The solution obtained may be treated for the manufacture of achroodextrin, or it may be saccharified and fermented for

the production of alcohol. An autoclave provided with an agitator is described, having several nozzles at different levels for the introduction of superheated steam.—J. F. B.

UNITED STATES PATENTS.

Malt Liquors; Manufacture of —. J. Schneible, New York. U.S. Pat. 694,671, March 4, 1902.

IN the cellar treatment of beers in process of manufacture, the beer, after primary fermentation is complete, is cooled, saturated with carbon dioxide, and the liquid, so charged under pressure, stored (in clarifying or chip casks) until clarification is effected. It is claimed that clarification takes place far more rapidly (five days or more) than under ordinary conditions of storage, and that the beer, being charged with gas, is in an immediately marketable condition.—H. T. P.

Beer; Process of Manufacturing Non-Alcoholic —. V. Lapp, Lindenau, Germany. U.S. Pat. 709,713, Sept. 23, 1902.

WORT is heated, aerated with pure air, saturated with ozone and then with carbon dioxide at a pressure of about 10 atmospheres. The wort is then cooled, still under that pressure, and filtered, relieving at the same time part of the pressure; it is then saturated with carbon dioxide and filtered again, and stored under a pressure of carbon dioxide of 10 atmospheres until bottled or racked off.—J. F. B.

XVIII.—FOODS; SANITATION; WATER PURIFICATION, & DISINFECTANTS.

(A.)—FOODS.

Macaroni, Spaghetti, Vermicelli, and Noodles. A. L. Winton and A. W. Ogden. Twenty-fifth Report of the Connecticut Agric. Exp. Station for 1901, 196–202.

MACARONI, spaghetti, and vermicelli are prepared by moistening wheat-flour, rich in gluten, with hot water, kneading into a dough, and forcing the latter through a perforated plate. "Noodles" are prepared by making a dough from flour mixed with a certain amount of eggs and salt, rolling into sheets, and cutting into strips or fanciful shapes. Most commercial "noodles," however, are not made with eggs, but have about the same composition as macaroni, the golden-yellow colour being produced by the addition of turmeric or a coal-tar dyestuff (Tropaeolin, Dinitrocresol, Martius Yellow, Naphthol Yellow S, &c.).

All the samples (37) of macaroni examined, appeared to have been made from wheat flour without the addition of any considerable amount of salt, eggs, or colouring matters. The amount of ash ranged from 0.38 to 0.96 per cent.; protein, 11.94–20.69; nitrogen-free extract (including fibre), 64.82–75.60; and fat, 0.15–1.11 per cent.

In 18 samples of spaghetti and vermicelli, the amount of ash ranged from 0.46 to 0.97 per cent.; protein, 11.94–15.31; nitrogen-free extract (including fibre), 71.52–74.83; and fat, 0.19–0.63 per cent.—A. S.

Cheese; Salts formed by Casein and Paracasein with Acids, and their Relations to American Cheddar —. L. L. Van Slyke and E. B. Hart. New York Agric. Exp. Station. Bull. No. 214, July 1902.

IN examining cheese for hetero-caseose by extraction with dilute solution of common salt, a substance other than hetero-caseose was detected. This compound, soluble in salt solution, is present in large quantities only when lactic acid is used in the manufacture of the cheese, being practically absent, or present in very small proportions, when no acid is used. In normal cheese the compound is always found, but in varying amounts, the proportion usually being largest in new cheese, and diminishing as the age of the cheese increases.

Paracasein, when treated with dilute lactic acid, furnishes a product resembling, in both physical and chemical properties, the substances, soluble in salt solution, extracted from cheese.



Both paracasein and casein combine with lactic, acetic, hydrochloric, and sulphuric acids in at least two different proportions, forming an unsaturated or mono-acid salt and a saturated or di-acid salt. The unsaturated salts are soluble in dilute solutions of sodium chloride and in 50 per cent. hot alcohol, but insoluble in water. The saturated salts are practically insoluble in all of the three solvents mentioned. Both forms are sparingly soluble in dilute solutions of calcium lactate and calcium carbonate. The changes taking place in cheese-curd during the process of cheddar cheese making, are due to the formation of the unsaturated paracasein lactate. According to the authors, the ripening process in normal cheddar cheese, by which the insoluble nitrogen compounds change into soluble forms, begins, not with paracasein, as has been generally held, but with unsaturated paracasein lactate. The water-soluble nitrogen in cheese generally increases as the unsaturated paracasein lactate decreases, and it is probable that the first step in the normal ripening process of American cheddar cheese is a peptic digestion of unsaturated paracasein lactate.—A. S.

Foods; Use of Coal-Tar Dyestuffs in —. A. L. Winton. Twenty-fifth Report of the Connecticut Agric. Exp. Station for 1901, 179–182.

As showing the extent to which the use of dyestuffs in foods has been carried, it is reported that, during 1901, 21 out of 66 samples of jellies and jams, and 86 out of 106 samples of catsup and other sauces, as well as most of the cheap cordials and lemon extracts examined at the station contained coal-tar dyestuffs. Among other articles in which these colours have frequently been detected, are milk, butter, cheese, ice cream, confectionery, pastries, flavouring extracts, mustard, cayenne pepper, sausages, "noodles," wines, and liquors.

Experiments on dogs and other animals by Cazeneuve and Lépine, Weyl, and others have proved, beyond doubt, the poisonous nature of Picric Acid, Dinitroresol, and Martius' Yellow among the nitro colours, and of Orange II, and Metanil Yellow among the azo colours. Magenta, sulphonated nitro colours, and most of the azo colours do not act as poisons, but some of them produce vomiting, others diarrhoea, and others albuminuria. The author points out that, although there is evidence that most of the coal-tar dyestuffs are not injurious to some of the lower animals, it is not safe to assume that they are entirely harmless to human beings.

Weber found that even at a dilution of 1 in 1,600, Oroline Yellow (Acid Yellow) retarded the action of pepsin in the artificial digestion of fibrin, and Methyl Orange, Saffoline (Acridine Red), and Magenta seriously interfered with the pancreatic digestion.—A. S.

Caffeine [in Tea, &c.]; Determination of —. J. Katz. See under XXIII., page 1300.

UNITED STATES PATENTS.

Raising or Lowering the Temperature of Liquids [Milk]; Machine or Apparatus for —. F. H. Floyd, Quincy, Mass., U.S.A. U.S. Pat. 708,703, Sept. 9, 1902.

THE liquid, such as milk, to be cooled is circulated in the spaces formed between a series of double convex hollow chambers and a similar series of double concave chambers. The cooling medium flows through the concave chambers, which are superimposed on each other to form a column.

—W. P. S.

Pasteurising Apparatus. B. F. Schirmer, Indianapolis, U.S.A. U.S. Pat. 708,738, Sept. 9, 1902.

THE apparatus consists of a tank containing water, which is heated to the desired temperature. The bottles containing the liquid to be pasteurised are placed in receptacles fixed to a travelling belt, and are thus carried into the tank, first passing through the heated atmosphere at the top of the tank, then through the hot water, and finally being automatically delivered from the tank at the opposite end to that at which they entered. The entrance and exit are closed by automatically shutting doors. On leaving the tank the bottles are sprayed with cold water.—W. P. S.

Cream Separator. C. B. Phillips, Blissfield, Mich., U.S.A. U.S. Pat. 708,730, Sept. 9, 1902.

THE drum of the separator contains a number of vertical partitions or wings, connected together by cone-shaped rings. The rings are hollow down the centre, and are in close contact at their outer and lower edge with the sides of the drum. A space is left between the edge of the lower cone and the side of the separator, through which the milk passes, after being run into the bottom of the drum through a hollow shaft entering at the top and passing down the centre of the separator.—W. P. S.

Centrifugal [Cream] Separator. J. P. Hultgren, Assignor to F. H. Getzmann, both of Stockholm. U.S. Pat. 708,643, Sept. 9, 1902.

INSIDE the separator drum is placed a vertical series of rings, each elliptical in cross-section and held together by vertical strips or ribs. Narrow slits are left between the rings, through which the separated milk passes.—W. P. S.

Milk Albumin; Process for producing Soluble —. H. V. Dunham, New York, U.S.A. U.S. Pat. 709,003, Sept. 16, 1902.

WHEY is concentrated, after the addition of 1 per cent. of ammonia (26°), to a thick syrup, the temperature being kept below the coagulating point of albumin during the evaporation. The milk-sugar is then allowed to crystallise out, and is removed. On adding 1 per cent. of hydrochloric acid to the syrup, the albumin is precipitated and is strained off, washed in a little water, and dried.—W. P. S.

Oleaginous Compound [Lard Substitute]. C. Adams, Bellows Falls, Ver., U.S.A. U.S. Pat. 709,291, Sept. 16, 1902.

A VEGETABLE oil, preferably cotton seed oil, is thoroughly incorporated with a solution of casein in approximately the proportion of 60 parts of oil to 7 parts of solution. The resulting semi-solid product is stated to be a good substitute for lard, which it resembles in appearance.—C. A. M.

Food Products; Process of Preserving —. W. D. Baker, Rogers, Ark., U.S.A., Assignor to E. B. Harrington, Kansas City, U.S.A. U.S. Pat. 709,431, Sept. 16, 1902.

THE articles to be preserved are placed in a chamber built of non-conducting walls, so that the temperature shall not vary. On shelves round the sides are placed open vessels containing charcoal, potassium carbonate, and a mixture of iron and sulphur. The charcoal is placed on the bottom shelf, the potassium carbonate on the next, then another shelf of charcoal, and on the uppermost are the vessels containing a moist mixture of iron (filings) and sulphur, and others holding a dry mixture of iron, sulphur, and potassium carbonate.—W. P. S.

Food Products; Process of Preserving —. W. D. Baker, Rogers, Ark., U.S.A., Assignor to E. B. Harrington, Kansas City, U.S.A. U.S. Pat. 709,432, Sept. 16, 1902.

THE food products are subjected to the action of the fumes arising from smouldering paper which has been steeped in a solution of potassium nitrate. The fumes are forced into the chamber by a fan. In the chamber are placed pans of potassium carbonate (for drying the fumes) and of charcoal.—W. P. S.

Eggs; Process of Preserving —. W. Shöning, Christiania. U.S. Pat. 709,583, Sept. 23, 1902.

THE eggs are dipped in hot water (not boiling) for a few seconds, and are then placed in a solution of cold salt water containing 10 per cent. each of ammonium chloride and sodium silicate.—W. P. S.

(B.)—SANITATION; WATER PURIFICATION.

Sewage Purification by the Bacterial System. A. D. Greatorex. Public Health Eng., Oct. 4, 1902, 316–322.

THE sewage in question is free from factory refuse, except that of breweries.



In view of the unsatisfactory results of irrigation and of complaints of nuisance arising therefrom, the local authority resolved to try two methods of bacterial treatment, viz.:—

High Level.—Preliminary passage through a "detritus" tank followed by bacterial treatment in one coarse bed, and finally by filtration through prepared land;

Low Level.—A coarse and a fine bacteria bed, $3\frac{1}{2}$ ft. and 3 ft. deep respectively.

The beds were filled with engine ashes, which, for the coarse bed, were screened as between a $\frac{3}{8}$ in. and a 2 in. mesh, and, for the fine, as between a $\frac{1}{4}$ in. and a $\frac{3}{8}$ in. mesh.

The object of the experiment was to prove whether sewage could be purified without supplemental land filtration.

Samples taken for analysis gave the following results:—

Low Level:—	Grains per Gall.
Suspended matter in crude sewage.....	54.17
" " in final filtrate.....	0.68
	Parts per 100,000.
Dissolved oxidisable matter in crude sewage....	3.251
" " in final filtrate.....	0.457

The oxygen test showed a total purification by the combined beds of 85.9 per cent., which, after land treatment, was increased to 88.9 per cent. The albuminoid ammonia test showed a total purification by the combined beds of 78.6 per cent., increased after land treatment to 82.4 per cent. These figures were subsequently confirmed by the "incubator test."

High Level.—The final filtrate from the one bacteria bed, combined with land treatment, showed a reduction of oxidisable matters in solution of 92.6 per cent. With supplemental land treatment, nitrification showed an increase of from 0.447 to 1.239 parts per 100,000 of nitric nitrogen.

In both cases the beds, after 12 months' continuous working, were as free from nuisance as when first filled, and the effluent was throughout superior to the water of the river into which it flowed.

ENGLISH PATENTS.

Water; Apparatus for Softening, Filtering and Purifying —. T. Waite, Bradford. Eng. Pat. 11,366, June 4, 1901.

THE apparatus includes two cylindrical vessels, on the same level and of similar height, but differing in size. Above the larger vessel, the water to be purified is run on to an overshot wheel or turbine, buckets connected to which discharge into hoppers communicating with a chute leading to a second wheel over the smaller vessel. The water passes from near the top of the smaller vessel downwards by a pipe leading to near the bottom of the larger vessel, then flows upwards through the latter through filtering beds alternated with chambers, wherein it is agitated by vanes worked by the flow, and finally passes outwards from the uppermost chamber. Lime or other purifying agent is supplied from above to the larger vessel, which, as well as the smaller vessel, has a settling bottom inclined in all directions to a side discharge valve.—E. S.

Water; The Purification or Sterilisation of —; Mechanism for adding Chemicals used in connection with Mechanical and other Filters. A. J. Bell and P. A. G. Bell, Manchester. Eng. Pat. 21,231, Oct. 23, 1901.

IN combination with a cylinder or tank containing the chemical solution to be used, and in which is a float, is a water-supply pipe in connection with a mixing chamber, fitted with valves controlled by the float in the cylinder, according to the density of the chemical solution therein, so that, if the solution become reduced in density, the float sinks, and thereby the valve admitting it to the mixing vessel is opened, so that more of the said solution is added to the water passing through the mixer, and *vice versa*, the mixture being always made proportionately to the strength of the solution. In a modified form of apparatus, the flow of the chemical solution into the water is adjusted without the use of a float.—E. S.

UNITED STATES PATENTS.

Water-purifying Apparatus. C. L. Kennicott, Assignor to Kennicott Water Softener Company, both of Chicago. U.S. Pat. 708,717, Sept. 9, 1902.

SEE Eng. Pat. 11,990; 1902; this Journal, 1902, 1192.

—E. S.

Liquids with Gases [Water with Ozone] or Gases with Liquids; Apparatus for Treating —. A. Vosmaer, Watergraafsmeer, and A. Lebrecht, Utrecht, Assignors to the Ozone Maatschappij Systeem A. Vosmaer, Amsterdam. U.S. Pat. 709,379 Sept., 16, 1902.

AN apparatus for treating water with ozone, and for similar purposes, in which the gas may be passed in fine bubbles through the liquid, without being carried away by the latter. An upright cylindrical vessel is provided at the bottom with an inlet-pipe for the gas; at the top, with an outlet for the gas and an inlet-pipe for the liquid to be treated; and at the side, with an outlet-pipe for the treated liquid. A horizontal diaphragm having very fine perforations (say 0.05 mm. diameter) is arranged above the gas-inlet pipe and just below the level of the liquid outlet-pipe. A perforated screen, in the form of an annular chamber extending round the cylinder, is interposed before the liquid-outlet pipe, the perforations having a diameter of about 0.25 mm. A tubular projection extends upwards from the diaphragm to above the screen. The gas is forced up through the perforated diaphragm into the liquid, which cannot work through the perforations, and any bubbles which do not at once rise through the liquid are caught by the annular screen, through which only the treated liquid can pass.

—H. B.

Garbage; Method of and Apparatus for Treating —. S. E. Wilson, Frenchland, Mich., U.S.A. U.S. Pat. 709,384 and 709,450, Sept. 16, 1902.

GARBAGE, distillery slops and the like, and especially matters from which it may be desired to extract grease, are treated in a series of digesting and compression tanks, in which the cooking and compressing "fluid" used may be steam, hot air, or vapours from naphtha, &c. The process consists in dividing the mass into a number of comparatively small portions, and cooking these within a closed tank, the latter being connected with a separate tank wherein an equal pressure is maintained; "applying fluid under pressure simultaneously to all the surfaces of the mass under treatment," and allowing the contained liquid therein to pass through to the pressure tank. Communication with the high-pressure tank is shut off, that with a low-pressure tank being opened. The mass upon that side opposite the connection with the low-pressure tank is now compressed, fluid under pressure being passed through the mass into the low-pressure tank. It is stated that a relatively dry mass is thus obtained. Provision for deodorising the escaping gases is made. Reference is made to U.S. Pat. 567,210, Sept. 8, 1896.—E.S.

Garbage; Apparatus for Cooking —. C. S. Wheelwright. U.S. Pat. 709,836, Sept. 23, 1902.

See under XII., page 1285.

XIX.—PAPER, PASTEBOARD, Etc.

Sulphite Lyes containing Soda; Determination of Alkali in —. R. Schwartz.

See under XXIII., page 1298.

Benzene and Cellulose; Reaction between —. A. M. Nastjukow.

See under XXIV., page 1302.

ENGLISH PATENT.

Textile Fabrics or Yarns; Mordanting or Dyeing [by Means of Viscose] —. A. Fielding. Eng. Pat. 20,398, Oct. 12, 1901.

See under V., page 1276.



Cellulose; Manufacture of Derivatives [Acetates] of —. H. E. Newton, London. From Farbenfabr. vorm. F. Bayer, Elberfeld, Germany. Eng. Pat. 21,628, Oct. 28, 1901.

SEE Fr. Pat. 317,007; this Journal, 1902, 870.—J. F. B.

Celluloid; Manufacture of —. J. N. Goldsmith and the British Xylonite Company, both of Brantham, Suffolk. Eng. Pat. 22,662, Nov. 9, 1901.

ALKYL esters of the acid or acids obtained by the action of a powerful oxidising agent (e.g., nitric acid) on fats, oils, or soaps are claimed as camphor substitutes in the manufacture of celluloid.—J. F. B.

UNITED STATES PATENT.

Paper-making Machines; Paper-making Wire for —. H. Parker, Verm. U.S. Pat. 709,934, Sept. 16, 1902.

The ordinary making-wire of the Fourdrinier paper-making machine is supported underneath by a perforated belt, which relieves the wire of the wear and tear experienced at the suction boxes. This belt consists of perforated metal such as aluminium-bronze, electro-plated with lead, the surfaces being coated with sheet rubber, which also extends through the perforations in the metal, and which is united to the metal by the affinity induced by the action of the process of vulcanisation on the lead coating.—J. F. B.

XX.—FINE CHEMICALS, ALKALOIDS, ESSENCES, AND EXTRACTS.

Thorite and Orangite. J. Schilling. Zeits. angew. Chem., 1902, 15, [37], 921—929.

A résumé of the literature relating to thorite and orangite, in which the subject is dealt with under the following headings:—I. Historical. The Discovery, Occurrence and Investigation of the Mineral. II. The Mineralogical Form, Fracture, &c. III. Chemical Composition (including recent analyses by the author).—H. B.

Mercuric Acetate; Oxidations with —. L. Balbiano and V. Paolini. Ber., 1902, 35, [15], 2994—2998.

The authors have found that olefines are oxidised by mercuric acetate, mercurous acetate being precipitated, acetic acid liberated and oxygen or hydroxyl becoming attached to the two carbon atoms at the double linkage. As the reaction takes place very gradually at ordinary temperatures, it affords a means of gently oxidising complicated molecules. The following results are here recorded:—

Lavo-pinene.—Three mols. of mercuric acetate were allowed to act upon 1 mol. of pinene in presence of water. No perceptible rise of temperature took place and the reaction was complete after 7—8 days. The main product, a new *dioxypinene*, $C_{10}H_{16}O_2$, is a nearly colourless oil with an odour of camphor; its density at 0° C. = 1.069 and it boils under 5 m.m. pressure at 145° C.; its benzene solution is optically inactive. This body is a keto-alcohol and the usual ketone and alcohol derivatives have been prepared. It yields, on oxidation by permanganate, acetone and terphenylic acid.

Anethol on oxidation with mercuric acetate for 12 days yields as a main product the *glycol*, $CH_3O.C_6H_4.C_3H_5(OH)_2$, crystallising in warty needles, m. pt. 98° C. It yields anisic acid on oxidation with chromic acid mixture and its diacetyl derivative boils at 210° C. under 41 m.m. pressure.

Safrol and Isosafrol.—Whilst isosafrol, like anethol, contains the propenyl, $CH_2.CH=CH$, group, safrol contains the isomeric allyl, $CH_2.CH_2.CH_2$, grouping. Mercuric acetate oxidises isosafrol, but the resulting glycol has not yet been purified. With safrol, on the other hand, the mercuric salt is not reduced even after several months, but a crystalline compound with mercuric acetate is produced, $CH_3O_2.C_6H_4.C_3H_5(OH)(HgC_2H_5O_2)$. If the reaction be allowed to proceed for 8—10 days only, a syrupy compound of the same composition is obtained; this result may be

due to isomerism or polymerism. Both compounds yield safrol on hydrolysis with acids. Terpinene and camphene also yield metallic compounds with mercuric acetate.

—J. F. B.

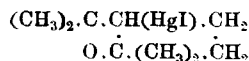
Terpineol and Dimethylheptenol; Mercuric Compounds from —. J. Sand and F. Singer. Ber., 1902, 35, [15], 3170—3187.

In a previous paper (this Journal, 1900, 1034), derivatives were described resulting from the combination of mercuric salts with ethylene compounds, characterised by having mercury in direct combination with carbon and by a tendency for two molecules to condense to form ether-oxide types.

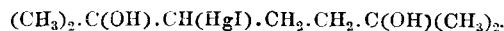
It is now found that terpineol and dimethylheptenol also react with mercuric salts in an analogous manner, yielding mercurised alcohols and mercury compounds with oxygen linkage, with the difference that the latter condensation occurs inside the molecule itself.

Terpineol.—Satisfactory reaction only occurs under special conditions; mercuric oxide is dissolved in nitric acid and terpineol is dissolved in ether; 10 per cent. potash lye is then added to the mercuric nitrate solution until a precipitate of basic nitrate appears; this is caused to redissolve by shaking it with some of the terpineol solution. This procedure is repeated until the further addition of potash turns the liquid black; the aqueous portion is then filtered, and nearly all the mercury is obtained in the aqueous filtrate. A considerable further quantity of caustic potash is then added and the calculated quantity of potassium iodide. A crystalline derivative is precipitated at once, insoluble in alkali, and two other products are obtained from the liquors, one after standing and the other after saturation with carbon dioxide. These three products have been identified as follows: The compound insoluble in alkali is the oxide-like condensation product, viz., mercury cineol iodide, $C_{10}H_{17}O.HgI$, it yields cineol on reduction; the less soluble, glycol-like compound is stable (α)-mercury-trans-terpin iodide, $C_{10}H_{19}O_2.HgI$; the more soluble product is an isomeride of this and is regarded as labile (β)-mercury-trans-terpin iodide.

Dimethylheptenol, obtained by the action of magnesium methyl iodide upon methylheptenone, has a structure very similar to that of terpineol, but acyclic; the action of mercuric salts is just the same. Reaction takes place quite easily in this case; the product insoluble in alkali, formed with internal condensation, is an oil, and has the constitution—



and the glycol derivative, soluble in alkali, is crystalline, melting at 124°—125° C., and having the formula—



—J. F. B.

Monohydroxybenzophenones. F. Ullmann and J. Goldberg. Ber., 1902, 35, [15], 2811—2814.

GRAEBE and Ullmann have shewn that the condensation of methylether salicylic chloride with benzene and aluminium chloride yields *o*-hydroxybenzophenone. The authors now further study this reaction, and have obtained 2-hydroxy-phenyl-4'-tolylketone from methylether salicylic chloride, toluene and aluminium chloride. They have also converted the chlorides of the *m*- and *p*-methoxybenzoic acids into the corresponding methoxybenzophenones, and find that, unlike *o*-hydroxybenzophenone, the methoxy group is not split off in the reaction, but may be removed on subsequent hydrolysis.—T. A. L.

Iodoform; Preparation of —, by means of Acetylene. O. Le Comte. J. Pharm. Chim., 16, [7], 297—300.

100 GRMS. of corrosive sublimate are dissolved in 2,000 c.c. of warm water, and after cooling, a current of purified acetylene is passed through. A white precipitate containing chlorine, mercury, and acetylene results; it is washed with distilled water until the washings cease to blacken with sulphuretted hydrogen, and dried at 100° in *vacuo*. The dry compound is mixed with 50 parts of cold water, 2 parts of iodine added, then slowly and with constant agitation a



1:20 solution of caustic soda, until the iodine has almost disappeared. If excess of alkali be added, the mixture rapidly blackens. The mixture becomes yellow, and acquires the characteristic odour of iodoform. The product is placed on a filter and washed:—

1st, with alkali (1:100) to remove any iodine remaining; 2nd, with distilled water; 3rd, with water acidulated (1:100) with hydrochloric acid, which prevents oxide of mercury forming; 4th, with distilled water, until the washings give no reaction with silver nitrate solution. Finally, the precipitate is dried *in vacuo*, and purified by crystallisation from boiling alcohol.—C. T. T.

Morphigenine and Epiosine. E. Vahlen. Ber., 1902, **35**, [15], 3044—3047.

THE author replies to criticisms by Pschorr (this Journal, 1902, 1094) upon his investigations on these substances. Pschorr stated that epiosine and the products of the sulphonation of morphigenine (aminophenanthrol) hydrochloride are not nitrogenous bodies. The author, however, re-affirms that his preparations do contain nitrogen. Pschorr also contended that "morphigenine sulphonic acid" and epiosine are not nerve poisons like morphine, but blood poisons, which convert the blood into methamoglobin. The author replies that morphigenine sulphonic acid is a mixture which does indeed contain blood poisons, but only in a minor degree, and that its narcotic effect has nothing to do with any action on the blood, but is a true nerve effect like that of morphine. Moreover, although epiosine will convert blood into methamoglobin in a test-tube, it does not do so in the body. The author adheres to his view that the physiological action of epiosine is similar to that of morphine.—J. F. B.

Digitalis Leaves; Valuation of —. H. Ziegenbein. Arch. der Pharm., **240**, [6], 455.

DOUBT having been thrown on the value of digitoxin determinations as furnishing data on which to base the therapeutic value of digitalis leaves, the author has made comparative experiments, determining both the digitoxin content and the actual lethal dose for frogs, with a large number of leaves from different sources. He finds that there is no connection between the figures; thus the lethal dose is the same, with leaves containing respectively 0.33 and 0.125 per cent. of digitoxin. It is further found that the extract of the leaves is from 2.5 to 6.5 times more toxic than corresponding amounts of pure digitoxin.—J. O. B.

Calumba Root [Jateorhiza Calumba]; Alkaloids of —. J. Gadamer. Arch. der Pharm., **240**, [6], 450—453.

CALUMBA root contains at least two alkaloids, similar to, but not identical with, berberine. The latter alkaloid does not occur in the root. Like berberine, Calumba alkaloids are quaternary bases, yellow in colour, and are converted by reduction into colourless tertiary hydro-compounds, which may be separated by shaking out with ether.—J. O. B.

Ipecacuanha; Indian —. B. H. Paul and A. J. Cowley. Pharm. J., 1902, **69**, [1680], 256.

THE authors have previously pointed out (see this Journal, 1901, 500) that the relative proportions of emetine and cephaeline in Brazilian and Columbian ipecacuanha are so different that the two kinds cannot be regarded as interchangeable. They have recently examined a sample of

Indian ipecacuanha and find that the latter resembles the Brazilian variety in that the proportion of emetine is greater than that of cephaeline. The results obtained are shown in the accompanying table, together with the figures obtained from samples of Brazilian and Columbian ipecacuanha.—A. S.

Ipecacuanha; Valuation of —, and *Determination of its Different Alkaloids.* B. H. Paul and A. J. Cowley.

See under XXIII., page 1292.

Ipecacuanha Root; Determination of the Alkaloidal Constituents of —. G. Frerichs and N. de Fuentes Tapis.

See under XXIII., page 1299.

"Quinine-tree"; South African —. Guritz. Chem. and Druggist, 1902, **61**, [1181], 482.

THE author, in his report as Cape Government Analyst, gives the results of an investigation of the bark of the so-called "quinine tree," or "Unijela" of the Transkei (*Tabernaemontana ventricosa*, Höchst), which grows in the Gxwaleni forest, in the Nyanduli district. From a chloroform extract of the bark, which has a bitter taste and is said to possess the therapeutic properties of quinine, the author obtained needle-shaped crystals of an alkaloid, the yield being nearly 0.2 per cent. of the weight of the bark. The alkaloid melts at about 200°C., has a bitter taste, is not fluorescent in acid solution, and is very soluble in chloroform, alcohol, benzene, and very dilute sulphuric and hydrochloric acids.—A. S.

Di-Cinchona Alkaloid Carbonic Acid Esters; Manufacture of —. Vereinigte Chininfabriken Zimmer and Co., Frankfort-on-Maine. Ger. Pat. 134,308. Supplement to Ger. Pat. 117,095, Feb. 28, 1899. Zeits. angew. Chem., 1902, **15**, [39], 1017.

IF, instead of an excess of phenyl carbonate as specified in the original patent, only one molecule of neutral phenyl carbonate be caused to react upon two molecules of cinchona alkaloid at elevated temperatures, di-alkaloid carbonates are obtained in a simple manner without the formation of mixed carbonates.—J. F. B.

Di-Cinchona Alkaloid Carbonic Acid Esters; Manufacture of —. Vereinigte Chininfabriken Zimmer and Co., Frankfort-on-Maine. Ger. Pat. 134,307. Supplement to Ger. Pat. 117,095, Feb. 23, 1899. Zeits. angew. Chem., 1902, **15**, [39], 1018.

IT has been found that the reaction between the cinchona alkaloids and phenyl carbonate ($C_6H_5O.CO.OC_6H_5$) takes place at lower temperatures than 150°C., as specified in Ger. Pat. 134,308 (see preceding abstract).—J. F. B.

Acetyl-quinine; Manufacture of —. Chem. Fabr. von Heyden, Radebeul, Dresden. Ger. Pat. 134,370, Aug. 24, 1901. Zeits. angew. Chem., 1902, **15**, [39], 1017.

ACETYLQUININE prepared in the usual way possesses an intensely bitter taste, owing to partial saponification with production of quinine during the process of purification. A product with only a slightly bitter taste is obtained by avoiding, at all events in the last recrystallisation, the use of water or alcohol. Pure acetylquinine, crystallised from anhydrous solvents, such as ether or hydrocarbons, melts at 116°—117°C.—J. F. B.

Strychnine and Brucine; Separation of —. Lyons.

See under XXIII., page 1300.

Strychnine; Determination of —. H. M. Gordin.

See under XXIII., page 1300.

Caffeine; Determination of —. J. Katz.

See under XXIII., page 1300.

	Indian.	Rio.		Columbian	
		Root.	Stem.	(two kinds).	
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Emetine	1.39	1.45	1.18	0.89	0.89
Cephaeline	0.50	0.52	0.59	1.25	0.95
Psychotrine	0.09	0.04	0.03	0.05	0.14
Total alkaloids	1.98	2.01	1.80	2.19	1.98

Cantharides; Japanese —. Paron Sing. J. Pharm. Soc. of Japan, June 1902. Chem. and Druggist, 1902, 61, [1181], 482.

It has been stated that the Japanese flies contain as much as 4 per cent. of cantharidin, but the author has never met with samples containing more than 2 per cent. For the determination of the cantharidin, 25 grms. of the powdered sample were treated with 200 c.c. of dilute nitric acid (1 in 20). After adding a little gypsum, the mixture was evaporated to dryness and extracted with chloroform. The chloroform solution yielded on evaporation a mixture of crystals and a heavy yellow oil; the latter was washed with the minimum quantity of ether. The cantharidin was finally dried and weighed; it melted at 207°—210° C.

—A. S.

Calamus Oil; Constituents of —. H. Thoms and R. Beckstroem. Ber., 1902, 35, 3187—3195.

The calamus oil investigated by the authors had a specific gravity of 1.0254 at 20° and an optical rotation of -0.68° in a 2-cm. tube at 26° C.; at the ordinary pressure the greater part of it distilled between 272° and 340° C.. The following compounds were found to be present in it: Heptylic and palmitic acids; eugenol; asarylaldehyde; palmitic and acetic acids in the form of esters; a compound, $C_{15}H_{26}O_2$, to which the name calameon is given, and which is described in the following paper; asaron, the presence of which explains the high methyl number obtained for the oil; and two hydrocarbons of the formula $C_{15}H_{22}$, one boiling at 151° under 22 mm. pressure and having an $[\alpha]_D^{20} = -13.38^\circ$ at 22°, and the other boiling at 146° under 19 mm. pressure and having an $[\alpha]_D^{20} = +34.83^\circ$ at 18° C..

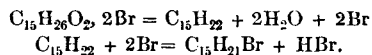
When asaron is treated with a concentrated solution of phosphoric or arsenic acid, it undergoes polymerisation into a compound, $(C_{15}H_{16}O_3)_n$, which is termed parasaron. This body is soluble in alcohol, acetone, chloroform, and acetic acid, from which liquids it cannot be crystallised out, but on evaporation of the solvent it remains as a glassy, crystalline mass. On oxidation with potassium permanganate, it yields neither asarylaldehyde nor asaric acid.—T. H. P.

Calamus Oil; The Calameon of —. H. Thoms and R. Beckstroem. Ber., 1902, 35, 3195—3200. (Compare preceding abstract.)

CALAMEON, $C_{15}H_{26}O_2$, forms shining crystals which belong to a hemihedral group of the rhombic system, and melt at 168° C. It is soluble in acetic acid, alcohol, and chloroform, to a less extent in ether or carbon bisulphide, but only very slightly so in light petroleum. Its optical rotation in alcoholic solution at 26° has the value $[\alpha]_D^{26} = -8.94^\circ$. As regards its chemical nature, it is analogous to cineol, which it closely resembles, the oxygen in the molecule being combined with two different carbon atoms to form a cyclic ring.

When oxidised with potassium permanganate, calameon yields a monobasic acid, $C_{15}H_{24}O_4$, to which the name calameonic acid has been given; this acid melts at 136° C., and is soluble in chloroform, acetic acid, and alcohol.

Calameon (1 mol.) absorbs bromine (2 atoms), yielding a compound which is very unstable and decomposes in the same way as the corresponding derivative of cineol:—



Calameon also forms an unstable additive compound with hydrogen chloride.

When heated with dilute sulphuric acid, calameon is converted almost quantitatively into a hydrocarbon, $C_{15}H_{22}$, which has been named calamene. This compound is a bright, strongly refracting liquid, which boils at 144° under 15.5 mm. pressure, and has the sp. gr. 0.9324 at 23°; it has the rotation $[\alpha]_D^{20} = -11.31^\circ$ at 26° C. Calamene yields a bromo-derivative, $C_{15}H_{21}Br$, and a crystalline hydrochloride melting at 108°, and on oxidation it is converted into acetic and oxalic acids, together with a very small proportion of an acid melting at 196°.—T. H. P.

Gardenia Oil; Properties and Chemical Composition of Essential —. E. Parone. Boll. Chim. Farm., 41, 489—498. Chem. Centr., 1902, 2, [10], 703.

For the preparation of pure gardenia oil, freshly gathered gardenias (5 kilos.) were macerated for 24 hours in 3 litres of vaseline oil, the turbid aqueous liquid separated, the vaseline extracted for several hours with small quantities of absolute alcohol, filtered, treated in the cold with six times its volume of a 16 per cent. solution of sodium sulphate, and the last traces of the gardenia oil separated by means of ether. The oil (yield, 176 grms. from 250 kilos. of flowers), after being dehydrated by means of calcium chloride, rapidly filtered, and dried by means of a current of carbon dioxide, formed a clear yellowish liquid, sp. gr. at 20.5° C., 1.009; b. pt. at 755 mm., 204° C., with partial decomposition; easily soluble in alcohol and ether; $[\alpha]_D^{20} = +1.47^\circ$ (at 20° C., 50 mm. tube). On distillation under reduced pressure (12—15 mm.), 170 grms. of the oil yielded the following fractions: 84°—91° C., 25 grms.; 91°—104° C., 114 grms.; 104°—150° C., 12 grms. In these fractions the following compounds were detected:—benzyl acetate, styrolyl acetate, linalool, linalyl acetate, terpineol, and methyl anthranilate. The oil probably also contains small quantities of benzoic acid in the form of an ester, and some other substances not identified. The principal constituent of the gardenia oil is benzyl acetate, but its peculiar scent is chiefly due to the styrolyl acetate, $C_6H_5CH(OC_2H_5O)CH_3$.—A. S.

Eucalyptus Macarthurii; Oil of —. H. G. Smith. Proc. Roy. Soc. of New South Wales; through Pharm. J., 1902, 69, [1632], 295.

THE author finds that the amount of the ester (geranyl acetate) contained in the oil of *Eucalyptus macarthurii*, does not fall at any time of the year below 60 per cent., and that the amount of free alcohol, considered as geraniol, diminishes as that of the ester increases. The greatest amount of naturally formed ester occurring at any time of the year was 74.9 per cent., in September, but the free alcohol was only 6 per cent. at that time. The oil does not contain phellandrene or eucalyptol at any time of the year. Endesmol is always present, the amount varying with the specific gravity of the oil. The crude oil appears to be always slightly dextro-rotatory.—A. S.

Vanilla Extract. A. L. Winton and L. Silverman.

See under XXIII., page 1300.

Lemon Extract. A. L. Winton and A. W. Ogden. Twenty-fifth Report of the Connecticut Agric. Exp. Station for 1901, 163—174.

LEMON extract, U.S.P., is a 5 per cent. (by volume) solution of lemon oil in strong alcohol, coloured with lemon peel. Imitation extracts are generally made either by shaking a small proportion of lemon oil with weak alcohol and filtering through magnesia to remove the excess of oil, or by dissolving citral in dilute alcohol. The bogus extracts are coloured golden-yellow with turmeric or, more commonly, with a coal-tar dyestuff. A reliable test for lemon extract is based upon the insolubility of lemon oil in weak alcohol. If a good lemon extract be diluted with half its bulk of water, the liquid becomes cloudy, and finally the oil rises to the surface; if no separation occurs, the amount of lemon oil in the extract is deficient.

With the exception of the tests for dyestuffs, the authors examined lemon extracts according to the methods described by A. S. Mitchell (see this Journal, 1900, 179).

For the detection of dyestuffs, a portion of the liquid remaining in the distilling flask after the determination of the alcohol, is examined according to Arata's method (see abstract on Vanilla Extract, page 1300). Turmeric is tested for by the boric acid method.—A. S.

Orange Extract. A. L. Winton and A. W. Ogden. Twenty-fifth Report of the Connecticut Agric. Exp. Station for 1901, 175—176.

ORANGE extract is a solution of orange oil in strong alcohol. The methods of analysis employed are the same as those for



lemon extract (see preceding abstract), except that the factor 5.2 instead of 3.4 is used for calculating the percentage of oil from the degrees of rotation on the sugar scale.—A. S.

Terpenes and Essential Oils. O. Wallach. Fifty-ninth and Sixtieth Papers. *Annalen*, 1902, **324**, [2 and 3], 269—280; 281—309.

THE fifty-ninth paper refers to investigations on phellandrene, and is divided under the following headings and sub-headings:—(1) Phellandrene-diamine from eucalyptus phellandrene: (a) monohydrochloride and its platinum salt; (b) benzoyl compound; (c) methylation of the phellandrene-diamine; (d) hydrochloride of the methyl derivative; (e) dry distillation of the phellandrene-diamine monohydrochloride; (f) reaction of phellandrene-diamine with sodium nitrite. (2) Phellandrene-diamine from the phellandrene of water-fennel oil.

The sixtieth paper bears the title: "Conversion of Cyclic Ketones into Alkamines and into Cyclic Nitrogenous Bases free from Oxygen." The subject is treated under the following headings:—(1) Conversion of cyclopentanone, $(\text{CH}_2)_4\text{CO}$, into piperidine, $(\text{CH}_2)_5\text{NH}$. (2) Conversion of methyl cyclopentanone into methyl piperidine. (3) Base, $\text{C}_{10}\text{H}_{20}\text{NH}$, from thujamenthoneisoxime. (4) Reduction of cyclohexanoneisoxime (α -ketohexamethyleneimine). (5) Bases from the isoximes of 8-methylcyclohexanone: (a) bases from α -isoxime; (b) bases from β -isoxime. (6) Bases from menthone-isoxime: (a) base free from oxygen; (b) oxy-base; (c) reduction of the base, $\text{C}_{20}\text{H}_{35}\text{ClN}$; (d) base, $\text{C}_{20}\text{H}_{40}\text{N}_2$ (?). (7) Bases from suberone-isoxime (α -ketoheptamethylencimine): (a) base, $\text{C}_{14}\text{H}_{21}\text{N}_2\text{O}$; (b) reduction of suberone-isoxime.—A. S.

ENGLISH PATENTS.

Acetyl-Salicylic Acid; Manufacture of Salts of — G. B. Ellis, London. From Chem. Fab. von Heyden, Radebeul, Saxony. Eng. Pat. 15,517, July 11, 1902.

ACETYSALICYLIC acid, and especially its salts, are hydrolysed during the process of concentrating their aqueous solutions, and are not obtainable in the solid form in a state of purity in this way. If, however, acetylsalicylic acid be suspended in an alcohol, ester, ether, acetone, hydrocarbon, carbon bisulphide, carbon tetrachloride, or chloroform, or a mixture of any of them, and a solution of caustic alkali or alkali-alcoholate in a similar medium be added to neutralisation, the salt separates in the solid state, a sufficient quantity of ether being added, if necessary, to complete the precipitation.

—J. F. B.

Electric Furnaces and the Production of Chemicals [Carbon Bisulphide] in such Furnaces. G. Brewer. From E. R. Taylor. Eng. Pat. 16,556, July 25, 1902.

See under XI. A., page 1283.

UNITED STATES PATENT.

Sulphonic Acids; Process of Separating — L. O. Helmers, Hamburg, Assignor to the Ichthyol-Gesell.-Cordes, Hermann and Co., Hamburg. U.S. Pat. 709,321, Sept. 16, 1902.

CERTAIN compounds, such as ichthyol sulphonic acid or the product obtained by the action of sulphuric acid on Seefeld oil are treated with an organic base such as aniline, piperazine, or dimethylphenylpyrazolone, effecting a separation, by reason of their solubilities in water, into compounds rich and poor in sulphur. The products formed are subsequently decomposed by mineral acids.—T. A. L.

XXI.—PHOTOGRAPHY.

ENGLISH PATENTS.

Photographic Paper. La Société Derepas Frères, Paris. Eng. Pat. 17,471, Aug. 31, 1901. (Under Internat. Conv., March 20, 1901.)

THE back of any description of paper which has to be given a coat of positive photographic emulsion is treated with a solution of gum lac in alcohol or in aqueous borax

solution, so as to form a layer that is adhesive when hot. After the usual photographic operations have been finished, the paper is fastened upon its final mount by being merely pressed down with a hot iron. This process has the advantage of protecting the image from any impurities in the card mount, and of eliminating distortion, inasmuch as the paper is both exposed and mounted in the dry state.

—F. H. L.

Photographic Half-Tones in Printing and Lithography; Producing — J. Vilim, Prague, Bohemia, and F. Hauser, Naefels, Switzerland. Eng. Pat. 14,105, June 21, 1902.

A PROCESS is described for obtaining an asphaltum plate suitable for ordinary or lithographic printing in mono- or polychrome, which gives half-tones without the use of a screen or the employment of any intermediate manipulation. The asphaltum is first partially extracted with ether, and then dissolved in a mixture of chloroform, ether, alcohol, and benzene, in proportions varying according to the coarseness of the grain desired. The film so prepared is exposed under a half-tone negative, developed in a single operation with a suitable mixture of turpentine, petroleum spirit, and benzene, then etched, and finally printed from as usual.—F. H. L.

XXII.—EXPLOSIVES, MATCHES, Etc

Dynamite Factory; Residual Products of the —, and their Value to the Gold Industry. W. Cullen. J. Chem. and Metall. Soc. of S. Africa, 1902, **3**, [4], 37—40.

NITRE-CAKE (acid sulphate of soda) is already used in Caldecott's process, and it is suggested that it might be employed economically in lieu of sulphuric acid for the solution of zinc-slims, one part of the salt in three of water giving a solution of suitable strength. Mixed with a little sulphuric acid to increase its fluidity, the compound might also be applied to the generation of chlorine; and to the solution of scrap iron for the production of ferrous sulphate as a precipitant.—W. G. M.

UNITED STATES PATENT.

Projectiles; Process of Hardening — R. A. Hadfield, Sheffield. U.S. Pat. 709,631, Sept. 23, 1902.

THE projectile, having its point protected by a cast-steel pot, is suspended and rotated point downward in a furnace, the point being heated to a very dull red, and the shoulder to a black heat. After this preliminary heating, the still protected point and shoulder of the projectile are heated in like manner, but to bright redness or a low yellow tint, and after withdrawal from the furnace, a cooling liquid, at about 60° F., is circulated under pressure through the chamber of the projectile, beginning before and continuing through the immersion of the latter in a cooling liquid at about 80° F., until the projectile is quite cool. Reference is made to Eng. Pat. 3237, 1892; and to U.S. Pat. 522,012. See also Eng. Pats. 6089 and 6091, 1901; this Journal, 1902, 410.—E. S.

XXIII.—ANALYTICAL CHEMISTRY.

INORGANIC—QUALITATIVE.

Hydroxylamine and Hydrazine Salts in Qualitative Analysis; Use of — E. Knoevenagel and E. Elber. Ber., **35**, [15], 3055—3067.

THE authors have studied the action of hydroxylamine and hydrazine salts and hydrogen peroxide, in acid and alkaline solutions, on the metals precipitated in acid solutions by sulphuretted hydrogen, and as the result of these investigations, give two methods of separation.

In the first method the well-washed metallic sulphides are dissolved in *aqua regia*, the solution evaporated to expel the excess of acid, and the residue poured into a mixture of 40 c.c. of 20 per cent. sodium hydrate and 20 c.c. of a cold saturated solution of hydrazine sulphate. The solution is boiled, diluted with an equal volume of water, cooled,



filtered, and washed with hot water till the precipitate is free from alkali.

The precipitate (N') contains metallic mercury, copper, and a trace of silver, with the hydrates of cadmium and bismuth.

The filtrate (F') contains tin, arsenic, antimony, and lead, as sodium salts, and traces of bismuth.

The precipitate (N') is dissolved in nitric acid, diluted, and the bismuth thrown down with ammonia. By boiling the ammoniacal filtrate and warming for half an hour on the water-bath, metallic mercury is separated. The filtrate from this precipitate, containing copper and cadmium, is acidified with hydrochloric acid and the copper precipitated with potassium sulphocyanide; this precipitate can be filtered after warming for half an hour on the water-bath. Cadmium is then precipitated with ammonium sulphide from the filtrate.

The filtrate (F') is saturated with sulphuretted hydrogen. Lead and bismuth are precipitated as sulphides, and can be detected by the usual methods. The tin, arsenic, and antimony remain in solution as sulpho salts, and can be precipitated as sulphides by sulphuric acid, and separated in the ordinary way.

Gold and platinum, if present, are precipitated with the copper in the metallic state, and remain as a residue on boiling the precipitate (N') with nitric acid. This residue is dissolved in *aqua regia*, the excess of acid evaporated, and the gold precipitated with sodium hydrate and hydroxylamine hydrochloride. Platinum remains in solution, and is precipitated by warming with hydrazine chloride.

In the second method of separation, the solution of the sulphides in *aqua regia*, is evaporated, and the residue taken up with 3—4 c.c. of warm concentrated nitric acid; this solution, with any remaining residue, is poured into 20 c.c. of concentrated ammonia, containing 5—10 c.c. of 4 per cent. hydrogen peroxide. By warming to about 80° C. for 5—10 minutes, a precipitate (N') is obtained, consisting of lead peroxide, bismuth hydrate, and stannic acid. The copper, cadmium, mercury, arsenic, and antimony remain in the ammoniacal solution (F').

The precipitate (N') is warmed in a porcelain dish with sodium hydrate and ammonium sulphide. Lead and bismuth are obtained as sulphides, and tin remains in solution, and may be readily precipitated as sulphide by the addition of acid.

The filtrate (F') is boiled to decompose excess of hydrogen peroxide, and warmed for five minutes on the water-bath with 0.5—1 gm. of hydroxylamine hydrochloride or hydrazine sulphate. Mercury is precipitated in the metallic state, and can be filtered through a double filter paper. The filtrate is allowed to stand for 12 hours with magnesium chloride, whereby any arsenic present is precipitated. After separation of the arsenic, copper is precipitated in the neutralised filtrate by warming for 10—15 minutes with potassium sulphocyanide, and, in the filtrate from this precipitate, antimony and cadmium are separated by ammonium sulphide.

The great advantages of these methods are that mercury can be readily and completely separated from tin, arsenic, and antimony, and that the use of ammonium sulphide is largely avoided. The first method is most suitable when gold and platinum are present, as it effects a ready separation of these metals from tin, arsenic, and antimony.

—B. F. D.

Ozone; Reactions and Preparation of — C. Arnold and C. Mentzel. Ber., 35, [15], 2902—2907.

In a previous paper (this Journal, 1902, 640), tetramethyl-*p-p'*-diaminophenylmethane was recommended as a reagent for the detection of ozone. It is best dissolved in methyl alcohol, whereby the colours produced are more intensified.

In former experiments the ozone prepared from barium peroxide by the action of concentrated sulphuric acid gave a bluish-green coloration with the tetra base; this was found to be due to the nitrous acid evolved from barium nitrite existing as an impurity. By using the pure peroxide a red-violet colour is produced, which assumes a blue tint

from the action of the acid vapours evolved, especially on warming the solution. This test can therefore be used to detect admixture of nitric oxide, chlorine, or bromine with ozone, the colour reactions in each case being distinctive. The cause of these variations is found in the fact that salts of the tetra base give a blue colour with ozone, whilst the base itself gives a red-violet.

Percarbonates and persulphates treated with concentrated sulphuric acid in the cold give the violet reaction, the former readily, the latter more slowly.

The action of the acid vapours may be hindered or completely counteracted by the addition of pyridine or some other weak base to the alcoholic solution of the reagent. A solution of the tetra base with three or four drops of ammonia to every 10 c.c. keeps well, and is especially useful in detecting ozone in the presence of chlorine, the effect of the chlorine on the reagent being completely destroyed by the ammonia.

Ozone in water gives a blue coloration with the tetra base, which is considerably increased by the presence of silver nitrate, cupric sulphate, or manganous sulphate. The following method gives good results:—

To 1—2 c.c. of a 2 per cent. solution of silver nitrate, or a 10 per cent. solution of manganous sulphate, one or two drops of the reagent are added, and subsequently 25—35 c.c. of the water to be tested; a blue coloration indicates the presence of ozone. Hydrogen peroxide under these conditions gives no colour. Nitrous acid and its salts give a greenish-yellow, and bromine and chlorine a red solution.

When hydrogen peroxide is present with ozone, it can be detected by the blue precipitate produced with benzidine and copper sulphate, ozone producing only a reddish colour. To detect traces of hydrogen peroxide in water, two or three drops of a 10 per cent. solution of copper sulphate are added, and the solution shaken for a few minutes with two or three drops of the benzidine solution. A blue precipitate indicates the presence of the peroxide.

Ozone was also readily formed by the action of clean phosphorus on moist air in diffused daylight. The following method works with perfect safety and better results, at the ordinary temperature. In a 1—2 litre flask, 15—20 c.c. of sulphuric acid are shaken with 3—6 grms. of the oxygen-carrying body previously ground with 3 parts of sand. (1—2 c.c. of a 10—30 per cent. solution of hydrogen peroxide may be mixed with 5—10 grms. of sand.)

Chlopin has recommended Ursol D as a reagent for detecting ozone. The authors have found very various colorations to be produced with ozone prepared by different methods, the dark blue colour not being produced with pure ozone prepared by the silent electric discharge. Neither was the reagent so sensitive as the alcoholic solution of the tetra base.—B. F. D.

Hydrocyanic Acid; Detection of —, in presence of *Sulphocyanic, Hydroferrocyanic, and Hydroferricyanic Acids and their Salts*. L. E. Preiss. Amer. Chem. J., 28, [3], 240—241.

The solution is freed from heavy metals and alkaline earths, and 25—50 c.c. are then treated for about 15 minutes with caustic potash and 0.5 gm. of aluminium filings, to reduce the ferricyanide to ferrocyanide, the completeness of the reduction being tested with ferrous sulphate in a small sample. After acidification with HCl, the hydroferrocyanic acid is precipitated by agitating with excess of mercuric chloride in the cold, filtering until clear. The precipitate is washed with dilute mercuric chloride solution, and the clear washings added to the filtrate, the whole being then made alkaline with caustic potash. The mercuric oxide precipitate is removed, and the filtrate boiled with ferrous sulphate, converting the potassium cyanide into ferrocyanide. After filtering and washing, the washings and filtrate are acidified with HCl, and treated with ferric chloride. The resulting thiocyanate is decolorised by mercuric chloride, and the Prussian blue precipitate can then be seen. If the solution be quite acid, and originally contained only a small amount of hydrocyanic acid, no precipitate will form until the green liquid has stood some time.—C. S.



INORGANIC—QUANTITATIVE.

Phenolphthalein in Alcoholic Solution; Titrations with —. R. Hirsch. Ber., 1902, **35**, [14], 2874—2877.

THE author shows that the assumption that no dissociation of soaps, &c., takes place in alcoholic solution is not correct. In the first place, the sensitiveness of phenolphthalein in alcoholic solution is much less than in aqueous solution, several drops of normal alkali being required in the former to produce the same colour as is given by 0.1 c.c. in the latter. The relative colour-intensities may be estimated as 100 for water, 10 for ethyl alcohol, and only 1 for methyl alcohol. The intensity in alcoholic solutions may be increased by increasing the proportion of phenolphthalein. If a coloured aqueous solution be heated, the colour decreases considerably and may even disappear, but if an alcoholic solution be heated, the colour increases; both, however, recover their original colour on cooling. If 1 per cent. of pure sodium acetate be added to a faintly coloured aqueous solution, an intense coloration ensues on boiling, indicating hydrolysis of the salt, but the same thing also occurs in the case of an alcoholic solution, the increase of colour being far greater than that produced on boiling a pure alcoholic solution. The following experiment shows that hydrolysis occurs also in the case of alcoholic soap solutions. An alcoholic solution of phenolphthalein was coloured with alkali, and then treated with sufficient acid so that no coloration was observable even at the boiling point. An alcoholic solution of sodium stearate was treated in the same way, and the two colourless solutions mixed together. An immediate red coloration was produced. This was caused, on the one hand, by the increased hydrolysis of the soap consequent on dilution, and, on the other, by the more vivid reaction of the free alkali with the larger quantity of indicator.

The red coloration of an alcoholic soap solution in presence of phenolphthalein is no indication of the presence of free alkali; the error may, however, be diminished by comparing the solution under titration with a boiling solution containing 5 mgrms. of phenolphthalein and 0.1 c.c. of normal soda in 100 c.c. of alcohol. When the colour-intensities of the two solutions are equal, free alkali is present.—J. F. B.

Sulphur in Coal; Determination of —. C. W. Stoddart. J. Amer. Chem. Soc., 1902, **24**, [9], 852—864.

THE author has made comparative determinations of the sulphur in different kinds of coal with the object of determining which method is the most generally applicable for rapid work. From the results thus obtained, he concludes that the standard method of combustion in oxygen in a bomb calorimeter under pressure is accurate with the most varying types of coal. Of the more practical methods, that of Eschka was found the best, provided the silica was dehydrated and separated. The other methods tried (Stolba's, Antony and Lucchesi's, and Thomson's) gave good results with certain coals, but were less reliable than the two preceding methods. Hodgson's method (fusion with sodium peroxide) was found unsatisfactory, the results being too low.—C. A. M.

Sulphur in Coal and Pyrites; Determination of —. A. Reitlinger. J. russ. phys.-chem. Ges., **34**, 457—461. Chem. Centr., 1902, **2**, [8], 610.

THE usual methods for the determination of sulphur in the above-named products, those of Eschka and von Hundes-hagen, take a considerable amount of time. The author has simplified the method of Antony and Lucchesi so that it can be rapidly carried out. 0.5 gm. of the coal in a finely-powdered condition is carefully mixed with 1 gm. of manganese dioxide, 0.5 gm. of potassium carbonate, and 0.5 gm. of magnesia. The mixture is ignited in a platinum crucible, the temperature being increased gradually. After cooling, the crucible is immersed in hot water, 10 c.c. of concentrated hydrochloric acid added, the liquid boiled till the mass has dissolved, the iron precipitated by ammonia, and the liquid filtered. The author finds that with this mode of working, the silica separates completely, and the tedious evaporation with hydrochloric acid is avoided. The

process may be further simplified by burning the coal (0.5 gm.) with a mixture of 1.5 grms. of magnesia and 1½ grms. of manganese dioxide. The ignition takes about half an hour.

Sulphur in pyrites is determined in a similar manner, in this case 0.5 gm. of the ore being mixed with 2 grms. of manganese dioxide, 1 gm. of potassium carbonate, and 1 gm. of magnesia.—A. S.

Sulphite Lyes containing Soda; Determination of Alkali in —. R. Schwartz. Chem.-Zeit., **26**, [77], 897.

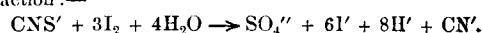
THE alkali present in a sulphite lye in combination with sulphurous and sulphuric acids, and as excess of sodium carbonate, was determined as follows: that in the state of sulphite, by titration with iodine solution in presence of starch, each c.c. of decinormal iodine solution corresponding to 0.0031 gm. of Na₂O. After decolorising the liquid with one drop of dilute thiosulphate solution, the alkali present as sodium carbonate was titrated with N/5 sulphuric acid and methyl orange, each c.c. of acid being equal to 0.0062 gm. of Na₂O. The alkali combined with sulphuric acid was determined in a fresh portion of the sample by acidifying with an excess of sulphuric acid, evaporating to dryness in a platinum basin, incinerating, and weighing as sodium sulphate, deducting from the result the figures obtained in the two preceding operations.—C. S.

Thiocyanates; Iodometric Determination of —. A. Thiel. Ber., **35**, [15], 2766—2768.

RUPP and Schied recently put forward a method for the determination of thiocyanates (this Journal, 1902, 990). The objection to this method is the formation of cyanogen iodide, which necessitates the use of small quantities of thiocyanate, and renders the starch iodine reaction, as an indication of the end stage, useless. The reaction is also not complete in less than four hours at the ordinary temperature.

Cyanogen iodide is rapidly decomposed in an acid solution, and this reaction is made use of in the following modified method.

10 c.c. of a N/10 potassium thiocyanate solution and 2 grms. of sodium bicarbonate, with sufficient water to effect complete solution, are placed in a loosely-stoppered flask with 50 c.c. of N/5 iodine solution, and allowed to stand at the room temperature for four hours. 20 c.c. of 2N hydrochloric acid are then added, and the excess of iodine at once titrated with N/10 thiosulphate solution, starch being used as an indicator. The following equation represents the reaction:—



The results are very accurate.—B. F. D.

Cement Analysis; Note on —. R. F. Young and B. F. Baker. Chem. News, 1902, **86**, [2234], 148.

THE usual method of determining lime in cement by dissolving in dilute hydrochloric acid, separating silica, alumina, and iron by means of ammonia, and then precipitating the lime as oxalate and weighing as CaO, is stated to be unreliable, the range of error being as much as ± 1.5 per cent. The authors state that the following two methods give very satisfactory results:—

(1) One gm. of the cement is treated with a small quantity of concentrated hydrochloric acid, a little nitric acid added, the mixture evaporated to dryness, and the residue heated to redness. After cooling, the material is extracted with dilute hydrochloric acid, and excess of ammonia added. The precipitated silica, alumina, and iron are filtered off, and the calcium separated as oxalate and ignited to calcium oxide in the usual way.

(2) One gm. of cement is dissolved in dilute hydrochloric acid, excess of ammonia added, the precipitated iron, alumina, and silica filtered off, redissolved in concentrated hydrochloric acid, and reprecipitated with ammonia. In the united filtrates and washings, the calcium is determined as above.

The authors have found that the volumetric method of determining calcium by titrating the excess of a known quantity of standard oxalic acid left after precipitating in ammoniacal solution, invariably gives low results.—A. S.

Iron; Analysis of —. F. Bischoff. *Stahl u. Eisen*, **22**, 719—727 and 754—759. *Chem. Centr.*, 1902, **2**, [8], 611.

It is generally known that, only exceptionally, do analyses of one and the same iron, if carried out by different analysts, give results that are sufficiently in accord. The author does not consider that the desired agreement in results can be attained by the demand that only certain well-defined methods should be employed. On the contrary, the causes of such great differences which obtain in iron analyses, as distinct from other chemical analyses, should be sought for, and the conditions necessary for their avoidance determined. The chief difficulty, according to the author, is the fact that iron is not of uniform composition throughout, and thus it is not easy to get representative samples. In distributing the samples among the different laboratories, the relative amounts of coarse and fine shavings and of powder should remain the same. The author describes the conditions which a laboratory for iron analyses should fulfil with regard to its arrangement, and then discusses the actual methods of analysis. He puts forward the figures in the following table as the highest permissible differences in accurate analytical work:—

Highest Permissible Variation in the Analytical Results.

Amount found per Cent.	C.	As, Cu, P, S, Si.	Al, Cr, Mn, Mo, Ni, W.
0.000—0.008	0.002	0.001	0.002
0.008—0.015		0.002	0.003
0.015—0.025		0.002	0.003
0.025—0.050		0.003	0.004
0.050—0.075	0.003	0.004	0.005
0.075—0.100	0.004	0.004	0.006
0.100—0.125	0.004	0.005	0.007
0.125—0.150	0.005	0.006	0.007
0.150—0.175	0.005	0.006	0.008
0.175—0.200	0.006	0.007	0.009
0.200—0.250	0.007	0.008	0.011
0.250—0.300	0.008	0.009	0.013
0.300—0.350	0.009	0.010	0.015
0.350—0.400	0.010	0.012	0.017
0.400—0.450	0.011	0.014	0.019
0.450—0.500	0.012	0.015	0.021
0.500—0.600	0.013	0.019	0.025
0.600—0.700	0.015	0.022	0.029
0.700—0.800	0.017	0.025	0.033
0.800—0.900	0.019	0.028	0.037
0.900—1.000	0.020	0.030	0.040
Over 1.000	2 per cent.	3 per cent.	4 per cent.

of the amount found.

For weighing out the samples of iron for the different determinations, the author uses special weights of aluminium, on which are imprinted the form in which the element is weighed, and the factor for the conversion of the weight into percentage.

The author gives details of the C, P, Mn, Cu, As, and S determinations, and also in a table the results of 53 complete analyses of different kinds of iron.—A. S.

Tellurium; Determination of —. G. Frerichs. *J. prakt. Chem.*, **66**, [17], 261—262.

THE usual statement in the text-books is that tellurium dioxide and tellurous acid are reduced by sulphur dioxide to metallic tellurium. The author finds that this reduction only occurs when the tellurous solution is mixed with from half its bulk to an equal bulk of strong hydrochloric acid, and then only after several hours' heating and passage of the sulphur dioxide. Nor does hydriodic acid, as stated by Peirce, effect the reduction. But in the simultaneous presence of sulphur dioxide and hydriodic acid, the reduction is immediate and complete, even in the cold. Hydrobromic acid can be substituted for the hydriodic acid, though the action is not so energetic. To the solution in sulphuric or hydrochloric acid of about 0.3 grm. of tellurium dioxide diluted to 100 c.c. with water, add 1—2 grms. of potassium iodide, heat to boiling (as the separated tellurium filters more easily when precipitated hot), and add about 50 c.c. of sulphurous acid solution; pass through a weighed filter, wash with water containing sulphurous acid, finally with alcohol and ether, dry at 100°—105° C., and weigh.—J. T. D.

ORGANIC—QUALITATIVE.

Dyestuffs; New Method for the Qualitative Analysis of the Artificial —. J. Pokorný. *Rev. Gén. des Mat. Col.*, 1902, **6**, [70], 247—251.

IN the author's opinion, of all the methods proposed for the qualitative analysis of artificial dyestuffs, that of Formánek is the simplest and most accurate (see this *Journal*, 1900, 788).—A. S.

ORGANIC—QUANTITATIVE.

Ipecacuanha Root; Determination of the Alkaloidal Constituents of —. G. Frerichs and N. de Fuentes Tapia. *Archiv der Pharm.*, **240**, [5], 390—400; [6], 401—423.

OF the three alkaloids in ipecacuanha, cephaeline and emetine are alone important, the third, psychotrine, having probably very little therapeutic action, and occurring in very small quantity. After numerous experiments, the authors recommend the following modification of Keller's process, in which the psychotrine, being insoluble in ether, is not determined. Six grms. of the root in fine powder are shaken in a bottle with 60 grms. of ether, 5 c.c. of solution of NH_4HO or of Na_2CO_3 solution (1:3) are added, and the mixture allowed to stand one hour, with repeated shaking; 10 c.c. of water are then added, and, after vigorous shaking and separation, 50 grms. of the ethereal solution are filtered into a flask. The ether is evaporated to half its volume, and the residue shaken in a separating funnel with 10 c.c. of N/10 HCl solution. The acid is separated, filtered into a flask, and the ether twice washed with 10 c.c. of water, the washings being filtered through the same filter as the acid, into the flask. The acid liquid is then made up to about 100 c.c., enough ether added to make a layer 1 mm. deep after shaking, and five drops of Iodeosine solution (1:250); the mixture is then titrated with N/10 NaOH solution. By multiplying the number of c.c. of N/10 NaOH used by 0.0241 (the mean of the molecular weights of cephaeline and emetine), the alkaloidal content of the 50 c.c. of ether (= 5 grms. of root) is obtained. If a determination of the alkaloids by weight is desired, which the authors recommend, the following procedure is convenient:—50 grms. of the ethereal solution are shaken with 50 c.c. of dilute HCl, and twice washed with 10 c.c. of water, acid and washings being run into a second separator. To the acid liquid, 5 c.c. of dilute NH_4OH and 50 grms. of ether are added, and the mixture shaken. After separation, 40 grms. of the ether (= 4 grms. of root) are filtered into a tared flask, the ether evaporated, the residue dried at 100° C., and weighed. The residue may be titrated after weighing, although owing to slight decomposition during drying, the end point is not easy to determine, but the results should agree fairly well. In order to ascertain if the residue consists of ipecacuanha alkaloids and not of substitutes, the authors recommend the following colour test:—The residue is dissolved in Froehde's reagent, and a crystal of NaCl is added; if cephaeline be present, a dark blue colour is formed. Emetine does not give any coloration. To determine cephaeline and emetine separately, the authors proceed as follows:—50 grms. of the ethereal solution, obtained as above, are shaken thrice with 10 c.c. of NaOH solution, which removes the cephaeline, and leaves the emetine in the ethereal solution; it is then determined. The difference between the total alkaloid and the emetine found gives the cephaeline.—J. O. B.

Ipecacuanha; Valuation and Determination of its Different Alkaloids. B. H. Paul and A. J. Cownley. *Pharm. J.*, 1902, **69**, [1633], 317.

THE authors state that in the valuation of ipecacuanha, it is not sufficient to ascertain the total amount of alkaloids in the root, but the relative proportions of at least two of them, emetine and cephaeline, should be determined. In the separation of the different alkaloids, so much of the drug should be taken that a sufficient weight—say 1 grm.—of the mixed alkaloids is obtained. It is pointed out that methods in which an aliquot portion of the alkaloid solution is taken as representing a definite corresponding fraction of the root operated upon, give inaccurate results. Linde



has explained this as being due to the fact that when the alkaloid is liberated, a concentrated solution is formed, which is more or less immiscible with the solvent, so that when the latter is decanted off, it does not fully represent the total alkaloids. Furthermore, the fraction decanted is different in weight and in volume from that originally added, and cannot be regarded as an exactly aliquot part of the original solvent.

Another source of error lies in the fact that the alkaloids are frequently titrated whilst dissolved in the solvent which has been used for extraction in presence of ammonia. The titration should always be carried out on the evaporation residue of the extract; in the case of ipecacuanha alkaloids, on the residue of the ethereal extract, dried at a low temperature.

The authors consider that many of the statements which have been published as to the relatively large amount of alkaloids in ipecacuanha root are owing to errors such as those mentioned. (See also this Journal, 1901, 500.)

—A. S.

Strychnine and Brucine; Separation of — Lyons. Chem. and Druggist, 1902, 61, [1183], 550.

THE author claims that the following method gives accurate results in the separation of strychnine and brucine in preparations of nux vomica. The alkaloids are extracted by one of the usual methods, dried, and weighed. They are then stirred in a beaker with sulphuric acid (1 c.c. of dilute acid to every 15 mgrms. of alkaloids) till the mass is completely disintegrated; the stirring is continued at frequent intervals for an hour. The residue is collected on a small filter, and the beaker rinsed out with 1 c.c. of dilute sulphuric acid, this being afterwards poured on to the filter above the insoluble residue as far as possible. The filter and residue are treated with 10 c.c. of chloroform and 3 c.c. of 10 per cent. ammonia solution till the residue has dissolved, and the solution then transferred to a separator by means of two washings of 5 c.c. each of chloroform. The separated chloroform is evaporated nearly to dryness in a tared dish, 2 c.c. of alcohol added, and the nearly pure strychnine dried and weighed. As a correction, 1.75 mgrm. is added for every c.c. of dilute acid used.

The amount of brucine is obtained by difference.—A. S.

Strychnine; Determination of — [Separation from Brucine]. H. M. Gordin. Paper read before the Amer. Pharm. Assoc., Philadelphia. Pharm. J., 1902, 69, [1683], 383.

THE mixed alkaloids from 8 or 10 grms. of nux vomica are dissolved on the water-bath in 15 c.c. of 3 per cent. sulphuric acid, the solution cooled, and 3 c.c. of cold nitric acid (1:1) added. The liquid is allowed to stand, with occasional gentle shaking, for exactly 10 minutes, and is then transferred to a separator containing 20 or 25 c.c. of 10 per cent. sodium hydroxide solution, the containing vessel being rinsed three or four times with very small amounts of water. The mixture in the separator should be very turbid, owing to the separation of strychnine. If this is not the case, a further addition of 1 or 2 c.c. of alkali must be made. The mixture is then extracted three times with chloroform, 20 c.c. the first and 10 c.c. each the second and third times. The chloroform solution is filtered into a tared flask through a small plain double filter, arranged so that there are four folds of paper on each side; the stem of the separator is rinsed with chloroform. The filter and funnel are now washed a few times with small amounts of chloroform, and to the perfectly colourless solution of strychnine obtained, 2 or 3 c.c. of pure amyl alcohol, distilling between 128° and 132° C., and leaving no residue on evaporation, are added. The amyl alcohol is stated to prevent the decrepitation of strychnine on the removal of the last traces of chloroform by heat. The chloroform is then distilled off from the solution, the amyl alcohol expelled by keeping the flask on the water-bath and blowing air over its mouth, and the flask finally dried for about two hours at 135°—140° C., and weighed. The method is said to give very accurate results, whilst the strychnine obtained is quite pure.—A. S.

Caffeine; Quantitative Determination of — J. Katz. Zeits. angew. Chem., 1902, 15, [39], 1013—1014.

SINCE the present methods for the estimation of caffeine are not quite satisfactory, the author proposes to modify Beiliter's method, which seems the most convenient, in the following manner:—10 grms. of the substance are shaken for half an hour with 200 grms. of chloroform and 0.5 gm. of ammonia. After the liquid has settled, the chloroform solution is filtered through a Sanders' "cigarette" filter, whereby 150 grms. of a perfectly clear filtrate free from water are obtained. The chloroform is distilled off from the filtrate, and the residue is dissolved in 5 c.c. of ether, if necessary with gentle warming under a reflux condenser, 20 c.c. of a 0.5 per cent. solution of hydrochloric acid are added, the ether is driven off, and the aqueous solution is cooled and filtered.

The flask and filter are washed a few times with 0.5 per cent. hydrochloric acid, and the acid liquid is exhausted with chloroform in a "perforator" (an apparatus devised by the author) or else by shaking four times with quantities of 20 c.c. of chloroform in a separating funnel. The chloroform extract is filtered, if necessary, and distilled. Results are given for raw coffee beans, black tea, guarana bread, and kola nuts. For Paraguay tea a special procedure is advocated. The ammonia-chloroform residue is dissolved in ether, water is added, and the ether is driven off. The aqueous solution is then heated on the water-bath for 10 minutes with 2 c.c. of a suspension of lead hydrate in water (1:20); 0.1 gm. of calcined magnesia is then added, and the mixture is cooled and filtered. The clear, faintly coloured filtrate is then exhausted with chloroform in the perforator.—J. F. B.

Vanilla Extract. A. L. Winton and M. Silverman. Twenty-fifth Report of the Connecticut Agric. Exp. Station for 1901, 149—162.

IN commercial vanilla extracts, the amount of sugar and alcohol is not always the same as in the U.S.P. tincture, and in some cases a certain proportion of glycerin or glucose is present. In six extracts prepared from different grades of beans according to the U.S.P. formula (100 grms. of beans per litre of extract), the sp. gr. varied between 1.0104 and 1.0166; vanillin, 0.065—0.215 per cent.; alcohol, 37.96—39.92; total residue, 21.75—23.13; cane sugar, 19.00—20.40; and residue other than cane sugar, 1.75—3.90 per cent. Of imitation extracts the best are those prepared from 3 parts of vanilla beans and 1 part of tonka beans; most of them, however, contain no genuine extract of vanilla beans, but are preparations of artificial vanillin, artificial coumarin, tonka beans, or a mixture of two or more of these materials, coloured with caramel. The chief adulterant is coumarin, added in the form of either artificial coumarin or extract of tonka beans.

The examination of vanilla extracts is carried out in the following manner:—

Total Residue.—5 grms. of the extract are mixed with previously ignited sand, and dried, first on the water-bath and then on the air-bath at 100° C.

Sugar.—13.024 grms. (one-half the normal weight) are dissolved in about 80 c.c. of water, 3 c.c. of basic lead acetate solution, and 2 c.c. of alumina cream added, the whole made up to 100 c.c., filtered through a dry filter, and the rotatory power determined.

Vanillin and Coumarin.—A slight modification of the method of Hess and Prescott (this Journal, 1899, 525) is used, the differences between the authors' process and the original being: (1) 2 per cent. instead of 10 per cent. ammonia is used; (2) a somewhat greater volume of ammonia is used; and (3) the vanillin and coumarin are weighed after evaporation of the ether solutions, before dissolving in petroleum spirit.

Alcohol.—25 grms. are diluted to 150 c.c., distilled, and the sp. gr. of the distillate determined.

Caramel, Coal-Tar Dyes, &c.—A portion of the brown solution, after the vanillin and coumarin have been extracted with ether, is shaken with fuller's earth and filtered. With a suitable grade of fuller's earth, the filtrate is yellow or colourless, and the fuller's earth a brownish colour, if

caramel be present. Another portion of the solution is tested according to Arata's method: 25–50 c.c. are diluted to 100 c.c., boiled for 10 minutes with 10 c.c. of a 10 per cent. solution of potassium bisulphate and a piece of white wool or woollen cloth, which has been previously heated to boiling in 0.1 per cent. solution of sodium hydrate, and thoroughly washed with water. The wool is removed from the solution, washed in boiling water, dried between filter paper, and examined as to the colouring matter, &c.

—A. S.

XXIV.—SCIENTIFIC & TECHNICAL NOTES.

Bismuth; Radio-active — [Polonium]. W. Marckwald. Chem.-Zeit., 26, [77], 895–896.

By means of the usual chemical reactions, the author isolated from the residue from Joachimsthal pitch blende, a sample of radio-active bismuth differing considerably from radium and more closely resembling the "Polonium" of earlier workers. Attempts to separate the active constituent from the bismuth showed that the portion of metal first deposited on electrolysis is far more active than the original material, the difference of potential enabling the separation to be effected with ease. On immersing a clean bismuth rod in a hydrochloric acid solution of the bismuth oxychloride employed, the active metal gradually deposited on the rod, in the form of a black film, about 0.6 grm. being obtained from 850 grms. of oxychloride. The deposit was not of uniform character, but contained bismuth, lead, antimony, vanadium, and traces of tellurium, &c. A probable method of purification is indicated by the fact that the metal can be precipitated by antimony as well as by bismuth, and that during reduction experiments in hydrogen, the bulk of the radio-active oxide sublimes, leaving a less active residue behind.

The rays from this metal differ from those of radium in being readily absorbed by thin satin paper, aluminium foil, or even varnish. A powerful fluorescence is imparted to zinc, and especially to the diamond, but not to glass, rock crystal, or other precious stones. Finally the radio-activity is superficial, the effect being independent of the thickness of the metallic stratum.—C. S.

Colloidal Silver; Experiments on the Formation of — F. Küspert. Ber., 35, [15], 2815–2816.

THE addition of a small quantity of silver nitrate solution to thick, colourless water-glass, containing as much formalin as can be added without giving a precipitate, gives a yellow cloudiness, which rapidly gives place to a dark green coloration; with large quantities of the silver salt, the colorations pass through reddish brown to dark red. These preparations of colloidal silver are very stable, and can be diluted to any extent, but are decomposed by potassium chloride or hydrate and sulphuretted hydrogen. The presence of iron in the water-glass gives solutions of much less stability.—B. F. D.

Colloidal, and Cane Sugar Solutions of Insoluble Inorganic Bodies. C. A. Lobry de Bruyn. Ber., 35, [15], 3079–3082.

THE author's experiments show that cane sugar acts in the same manner as gelatin in holding inorganic bodies in colloidal solution.

1 c.c. of N/10 potassium chromate and 1 c.c. of N/10 silver nitrate, were mixed with 10 c.c. of sugar solutions of varying strength.

With a 65 per cent. sugar solution, a transparent red solution was obtained, which very slowly clouded on standing. With 50 per cent. and 25 per cent. sugar solutions, the clouding was more rapid.

Silver chloride formed in the same way, with the concentrated sugar solution, a colourless solution, which gradually appeared opalescent, especially on warming; with the weaker solutions of sugar, only a slight retardation of precipitation was observed, a flocculent precipitate of silver chloride soon being formed.

The precipitation of sulphur from a solution of sodium thiosulphate in water, by the action of acids, as is well

known, requires a certain time interval; a 65 per cent. sugar solution retards the precipitation considerably, giving solutions with a reddish-brown opalescence.—B. F. D.

Colloidal Hollow Bodies from Heptylamine Soaps and Water; Formation of — F. Krafft and R. Funcke. Zeits. physiol. Chem., 35, 364–385.

THE so-called "myelin forms" produced when drops of soap solution are introduced into water have, up to the present, been regarded as products of incomplete emulsification. The authors consider that they are due to the swelling of colloidal hollow bodies; the conditions which are favourable for the formation of a permanent foam and therefore of a colloidal membrane, also favour the production of "myelin forms."

In series of compounds a gradual change from the crystalloidal to the colloidal form can be recognised; in the case of sodium soaps, the colloidal character increases with the molecular weight of the fatty acid, whilst with alkylammonium salts, it increases with the molecular weight of the alkyl residue. According to the above the heptylamine salts of the higher fatty acids should have a decided colloidal character, and should consequently have the power of forming a membrane. This was found to be the case; the colloidal hollow bodies from heptylamine soaps have a considerable power of swelling and give excellent "myelin forms." Heptylamine carbonate gives "myelin forms" with water, but the heptylamine salts of low melting acids of the oleic series are much better in this respect. For the formation of colloidal hollow bodies capable of swelling, heptylamine erucate is specially suited; the higher melting soaps (elaidate, brassidate) give "myelin forms" only with warm water. On cooling, the colloidal forms shrink and are converted into crystals. The colloidal hollow bodies exhibit osmotic phenomena, whilst with Methylene Blue, Malachite Green, and Magenta they become intensely coloured. They effect polarisation and double refraction of light, but these optical properties disappear when the hollow bodies are solidified to crystals (by cooling).—A. S.

Ozonic Acid. A. Baeyer and V. Villiger. Ber., 1902, 35, [15], 3038–3039.

OZONE acts on dry powdered caustic potash, forming a dark orange-brown mass, which is stable in the absence of moisture, but decomposes with evolution of gas on adding water. The product, *potassium ozonate*, can also exist in aqueous solution, since, when ozonised oxygen is passed into 40 per cent. potash lye cooled in a freezing mixture, the liquid becomes dark orange-brown; the colour, however, quickly disappears when the temperature is allowed to rise. Rubidium hydroxide behaves similarly, whilst soda lye is only coloured a faint yellow. With regard to the constitution of the potassium salt, it is most probably identical with potassium tetroxide. If this should prove to be the case, ozonic acid must be regarded as the hydrate of ozone, $O_3 + H_2O = O_4H_2$.—T. A. L.

Cobalt; Compounds of Silicon with — A New Cobalt Silicide. P. Lebeau. Comptes Rend., 135, [12], 475–477.

By heating in the electric furnace a mixture of cobalt and fused silicon, or, better, of copper silicide (200 parts), cobalt (20 parts), and crystallised silicon (30 parts), a compound Si_2Co is obtained. It forms dark-coloured crystals with a bluish sheen, has a sp. gr. of 5.3, and is very resistant to the action of reagents, with the exception of hydrofluoric acid, which decomposes it readily.

Thus three compounds of cobalt and silicon exist— $SiCo_2$, $SiCo$, and Si_2Co ; these are completely analogous to the corresponding compounds of iron.—J. T. D.

Vanadium Silicide; New — H. Moissan and Holt. Comptes Rend., 135, [13], 493–497.

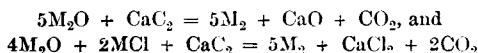
THE compound V_2Si is obtained by heating in the electric furnace a mixture of (1) silicon with a large excess of vanadium trioxide; (2) silicon, carbon, and vanadium trioxide; or (3) silicon, copper, and vanadium trioxide.



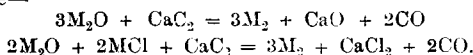
In cases 2 and 3 vanadium carbide and copper silicide are formed as intermediate products. Brilliant silver-white metallic-looking prisms, attacked readily by fluorine when warmed, and by chlorine, bromine, or hydrochloric acid gas at a red heat, and readily converted by excess of silicon in the electric furnace into the silicide formerly described by the authors, VSi_2 . The experiments involved in the preparation of this substance prove that the laws governing equilibrium in solutions at the ordinary temperature also hold for the reactions between silicon and vanadium carbide, or vanadium and copper silicide, in the electric furnace at their boiling-points.—J. T. D.

Calcium Carbide; Equation representing the Reaction during Reduction by —. B. Neumann. Zeits. f. Elektrochem., 1902, 8, [40], 772—774.

EXPERIMENTS show that v. Kügelgen's equations—



are incorrect, and that carbonic oxide is produced (see this Journal, 1901, 126 and 582). The equations previously given by the author, and called in question by v. Kügelgen were—



—W. G. M.

Tartar Emetic, Crystallised; A Stable Form of —. F. E. Hale. J. Amer. Chem. Soc., 1902, 24, [9], 828—847.

In a previous communication (Amer. J. Sci., 46, 206) the author showed that a standard solution of tartar emetic (16 grms. per litre) required somewhat more than the theoretical amount of $\text{N}/10$ iodine solution for oxidation. He now finds that this is due to the readiness with which tartar emetic loses its water of crystallisation. In order to obtain a compound corresponding with the formula, $\text{K}_2\text{SO}_4\text{H}_4\text{O}_6 \cdot \frac{1}{2}\text{H}_2\text{O}$, on titration with iodine solution, the tartar emetic should be recrystallised in medium-sized crystals, and the latter washed with water two or three times, drained with the aid of a suction pump for 5 to 10 minutes, and exposed to a dry atmosphere for 3 to 4 hours at a temperature not exceeding 25°C .—C. A. M.

Benzene and Cellulose; Reaction between —. A. M. Nastjukow. J. russ. phys.-chem. Ges., 34, 231—235; 505—508. Chem. Centr., 1902, 1, [22], 1277; 2, [8], 576.

If benzene be added to a solution of cellulose in strong sulphuric acid, heat is developed and a distinct reaction takes place. After treatment with ice, the reaction product forms a dark-brown, amorphous, infusible precipitate, insoluble in the ordinary solvents. The compound is not tetraphenylcellulose. When dried in the exsiccator, its composition is $\text{C}_{180}\text{H}_{134}\text{O}_{25}\text{S}_2$, whilst that of the product dried

at 105° — 110°C , is $\text{C}_{180}\text{H}_{138}\text{O}_{22}\text{S}_2$. The author considers the two preparations as aggregates of six mols. of tetraphenylcellulose + 2SO_2 —9 and 12 mols. of H_2O respectively. This tetraphenylcellulose derivative gives on dry distillation, toluene as the chief product, and on oxidation with permanganate, benzoic acid. It appears, therefore, that the phenyl groups are united directly to a carbon atom.—A. S.

Osones; Preparation of —, from the Osazones of Sugars. E. Fischer and E. F. Armstrong. Ber., 1902, 35, 3141—3144.

THE authors have introduced a new method for converting the osazones of sugars into osones, consisting in boiling the aqueous solution of the osazone for a short time with benzaldehyde. The method works well with the osazones of the disaccharides, but cannot in general be applied to the monosaccharides, owing to the very slight solubility in water of their osazones; it can, however, be used with the osazones of arabinose and xylose, which are soluble in hot water.

Experiments have also been made on the behaviour of the osones of the disaccharides towards enzymes, and it has been found that this corresponds with that of the sugars themselves. Thus, maltosone is resolved by yeast-maltase into dextrose and glucosone, and melibiosone is hydrolysed by emulsin, or by the enzymes of bottom yeast, into galactose and glucosone.—T. H. P.

New Disaccharides; Synthesis of some —. E. Fischer and E. F. Armstrong. Ber., 1902, 35, 3144—3153.

FOR the synthesis of disaccharides the authors have made use of the action taking place between an acetochlorohexose and the sodium derivative of a hexose, and in this way they have succeeded in preparing three different disaccharides. These compounds, which are regarded as being of the nature of glucosides, and are hence named glucosidogalactose, galactosidoglucose, and galactosidogalactose, form osazones fairly readily soluble in hot water; they can, therefore, be easily separated from the monosaccharides and their composition determined. The compound galactosidoglucose very closely resembles melibiose in its structure, its behaviour towards enzymes, and in the properties of its phenylosazone and bromophenylosazone and is almost certainly identical with it.

Another new disaccharide, which is, however, not identical with either lactose or melibiose, has been obtained by the synthetic action of the lactase found in kephir grains on a mixture of glucose and galactose. This sugar, to which the name isolactose has been given, occupies in its behaviour towards enzymes an intermediate position between lactose and melibiose. Kephir lactase also produces a disaccharide from dextrose alone, and the same is the case with emulsin and a mixture of dextrose and galactose.

The behaviour of these various sugars towards yeasts, emulsin, and kephir lactase is shown in the following table:—

—	Top Yeast.	Bottom Yeast.	Emulsin.	Kephir Lactase.
Lactose.....	Unchanged	Unchanged	Hydrolysed	Hydrolysed.
Isolactose.....	..	Fermented	..	Hydrolysed.
Melibiose.....	Unchanged	Fermented	Hydrolysed	..
Galactosidoglucose.....	..	Fermented	Hydrolysed	..
Glucosidogalactose.....	..	Fermented	Hydrolysed	..
Galactosidogalactose.....	..	..	Hydrolysed	..

—T. H. P.

Sugars; Isomeric Acetohalogen Derivatives of —, and the Synthesis of Glucosides. III. E. Fischer and E. F. Armstrong. Ber., 1902, 35, 3153—3155. (See this Journal, 1901, 1151.)

THIS communication, which is a completion of the two previous papers by the authors on this subject, gives descriptions of the preparation and properties of β -acetobromomaltose, heptaacetylphenolmalto-side, β -phenolmalto-side, and β -ethylgalactoside. The last-named compound,

like β -methyl- and β -phenol-galactosides, is hydrolysed by emulsin, and all three of these galactosides are hydrolysed by kephir lactase.—T. H. P.

β -Naphthyl Hydrazones of the Sugars; Isomers of —. W. A. v. Eckenstein and C. A. Lobry de Bruyn. Ber., 35, [15], 3082—3085.

THE authors compare the properties of the β -naphthyl hydrazones of the sugars prepared in weak alkaline

alcoholic solutions, according to the method used by Hilger and Rothenfusser, with those prepared by the following method. The hydrochloride of β -naphthylhydrazine is mixed with the equivalent of sodium acetate, and a concentrated solution of the sugar in water. The hydrazone separates out on standing.

Galactose- β -naphthylhydrazine prepared by this method has a m. pt. 167° , and a rotation of $+24^\circ$. That prepared by the alkaline method gives a rotation of $+10^\circ$.

From glucose, two hydrazones were prepared of m. pt. 125° and 158° — 159° , the latter with a rotation of $[\alpha] = +22^\circ$ (Auer). Hilger and Rothenfusser's method gave a hydrazone with m. pt. 178° and $[\alpha] = +11^\circ$.

In general, the hydrazones prepared in slightly acid solution have a lower melting point, and are less stable to the action of light and boiling alcohol.

These differences the authors consider to be due to the fact that the different methods of preparation give rise to the formation of isomeric hydrazones.—B. F. D.

Nitric Esters; Saponification of.—L. Vignon and I. Bay. *Comptes Rend.*, **135**, [13], 507—509.

The reducing action on Fehling's solution shown by the nitric esters of erythritol, mannitol, dulcitol, pentaerythritol, &c., is accompanied by, and is, no doubt, correlated with, the saponification of the esters by the alkali of the Fehling's solution. The authors have investigated the conditions of saponification by water, by acid, and by alkali of the nitric esters of the alcohols named, together with those of methyl alcohol, ethyl alcohol, and glycerin. In the case of water, there is no saponification in any instance, either on heating on the water-bath, or on boiling at atmospheric pressure; but in a sealed tube at 110° — 120° C., the esters of the 4-, 5-, and 6-carbon alcohols are completely saponified. In the case of acid and of alkali, saponification occurs at the boiling point under atmospheric pressure; but the laws governing the rate and the equilibrium limit of this saponification are complex, and are affected both by the oxidisability of the alcohol produced, and by the easy reducibility of nitric acid to nitrous acid, nitrogen, or ammonia.—J. T. D.

New Books.

THIRTY-EIGHTH ANNUAL REPORT ON ALKALI, &c., WORKS. By the CHIEF INSPECTOR. Proceedings during the year 1901. Presented to the Local Government Board and to the Secretary for Scotland. Ordered, by the House of Commons, to be printed, 21 July 1902. Messrs. Eyre and Spottiswoode, East Harding Street, Fleet Street, London, E.C.; 32, Abingdon Street, Westminster, S.W. Oliver and Boyd, Edinburgh, Scotland. E. Ponsonby, 116, Grafton Street, Dublin. 1902. Price 9d.

This, the Government Alkali Inspector's Report for 1902, forms an 8vo volume, containing table of contents and 152 pages of subject-matter, 49 pages of which are occupied by the Chief Inspector's Special Report to the Local Government Board. The arrangement of matter and items dealt with are as follows:—I. Report to the Local Government Board. II. Number of Registered Works. III. Separate Processes of Manufacture under Inspection. Number of Visits to Works and of Tests made. IV. Average Amount of Acid Gases escaping in each District. V. Prosecutions under the Alkali Acts. VI. The Amending Bill of 1901. VII. Alkali and Wet Copper Works. VIII. Chlorine. IX. Alkali Waste Works. X. Sulphuric Acid Works. XI. Concentration and Rectifying of Sulphuric Acid. XII. Chemical Manure Works. XIII. Sulphate and Muriate of Ammonia. XIV. Experiments on Methods of Treatment of Foul Gases evolved in Sulphate of Ammonia Manufacture from Gas Liquor. XV. Reaction of Sulphuretted Hydrogen upon Sulphite and Thiosulphate of Iron. XVI. Recovery and Production of Ammonia. XVII. Salt Works. XVIII. Cement Works. XIX. Arsenic Works. XX. Venetian-Red Works. XXI. Tar Works. XXII. Zinc Works. XXIII. Future of Electro-Chemistry. XXIV.

Reports from Ireland, North of England, Cheshire, North Wales and part of Lancashire, Widnes and Runcorn, North and East Lancashire and part of Yorkshire, East and South Midland, South-West of England and South Wales, Eastern and South-Eastern Counties. Report to H.M. Secretary for Scotland. Works under Inspection. Mr. Curphey's Report. Raw Materials and Products. Alkali, &c. Works Amending Bill of 1901. New Processes of Manufacturing Sulphuric Acid. Sulphate of Ammonia Works. Recovery of Ammonia in Shale Works, in Iron Works, and in Gas Works. The Claus Sulphur-Recovery Method modified for treating Gases containing small percentage of Sulphuretted Hydrogen. Use of Blast-Furnace Gases in Gas Engines.

ANNUAL REPORT OF THE CHIEF INSPECTOR OF FACTORIES AND WORKSHOPS FOR THE YEAR 1901. PART II. TABLES. Presented to both Houses of Parliament by Command of His Majesty. Eyre and Spottiswoode, East Harding Street, Fleet Street, London, E.C.; and 32, Abingdon Street, Westminster, S.W. Darling and Son, Ltd., 34-40, Bacon Street, E.C. Oliver and Boyd, Edinburgh, Scotland. E. Ponsonby, 116, Grafton Street, Dublin. 1902. Price 10d.

GOVERNMENT Blue Book, containing title page, table of contents, and 59 pages of subject-matter, mostly tables, i.e., tabulated statistics. These refer to the following items:—(1) Inspectors and Assistants. (2) Districts and Staff. (3) District totals. (4) Factories and Workshops under Special Rules. (5) Notices received by H.M. Inspectors. (6) Overtime Reports. (7) Ditto, Wearing Apparel. (8) Representations to Local Authorities. (9) Certifying Surgeons' Annual Report. (10) Accidents: *Degree of Injury, Age*; (11) *Industry, Age, Sex*; (12) *Industry, Causation*; (13) *Industry, Degree of Injury*; (14) *District, Causation*; (15) *District, Causation*. (16) Lead, Mercury, Phosphorus, and Arsenic Poisoning, and Anthrax. (17) Prosecutions: *Offence, Number, Penalty*; (18) *District, Offence*; (19) *Industry, Offence*; (20) *Under Special Rules*; (21) *Penal Compensation Cases*. (22) Fatal Accidents in Docks, &c., reported by Certifying Surgeons, July—December 1901. (23) Non-fatal Accidents in Docks, &c., reported by Certifying Surgeons, July—December 1901. (24) County of London, 1898: Factories (or Departments) employing more than 100 persons. (25) Administration of the Factory Acts, 1891—1901.

AIDS TO THE ANALYSIS AND ASSAY OF ORES, METALS, AND FUELS, &c. By J. JAMES MORGAN. Baillière, Tindall, and Cox, 8, Henrietta Street, Covent Garden, London, W.C.; 16, Lincoln Place, Dublin. Thin, Livingstone, Edinburgh and Glasgow. 1902. Price 2s. 6d., cloth; paper cover, 2s.

This little work, of foolscap 8vo size, contains preface, table of contents, and subject-matter filling 98 pages, followed by the alphabetical index. There are eight illustrations.

The ores, metals, and fuels, the analyses and valuations of which are given, are as follows:—Copper Pyrites; Galena; Zinc Blende; Tin Ores; Iron Ores; Manganese Ores; Chrome-Iron Ores; Dry Assay of Copper Ores; Lead Ores; Tin Ores, Silver Ores, and Gold Ores. Zinc. Lead. Tin. Copper. Iron and Steel. Nickel. Aluminium. Spiegeleisen. Silico-Spiegel and Ferro-Manganese. Ferro-Chrome. Ferro-Tungsten. Ferro-Aluminium. Ferro-Nickel. Ferro-Silicon. Coal, Coke, Patent Fuel (Charcoal). Liquid Fuels, Gaseous Fuels, Flue Gases, &c. Limestone, Lime, Magnesite, and Dolomite. Fireclay, Firebricks, Silica Bricks, Ganister, Sand, Fuel-Ash, and Boiler Incrustations. Slags. Alloys. White Alloys. Water for Technical Purposes, &c.



Trade Report.

I.—GENERAL.

GENERAL EXPORTS OF THE UNITED KINGDOM FOR THE YEARS 1900-1.

Articles, and Countries to which Exported.	Quantities.		Value.	
	1900.	1901.	1900.	1901.
Aerated Waters:			£	£
Foreign Countries ..	845,195	646,410	130,735	101,332
British Possessions ..	261,169	261,043	41,985	43,523
Total	1,105,364	907,453	172,720	144,855
Arms, Ammunition, &c.:				
Gunpowder:	Lb.	Cwts.		
Foreign Countries ..	1,770,700	11,171	45,181	43,520
British Possessions ..	5,276,500	50,130	112,692	129,079
Total	7,047,200	61,301	157,873	171,599
Percussion Caps:	Thousand	Thousand		
Foreign Countries ..	193,595	339,737	15,756	17,882
British Possessions ..	95,110	83,896	7,829	7,643
Total	288,615	414,633	23,585	25,525
Unenumerated:				
Foreign Countries ..	..	..	393,211	..
British Possessions ..	..	..	634,915	..
Total	..	..	1,028,129	..
Arms, Ammunition, Military and Naval Stores:				
Cordite and other smokeless Propellants:		Cwts.		
Foreign Countries ..	..	11,488	..	216,351
British Possessions ..	..	2,367	..	23,582
Total	..	14,055	..	240,233
Dynamite and other High Explosives:				
Foreign Countries ..	..	12,986	..	76,749
British Possessions ..	..	67,693	..	366,071
Total	..	80,679	..	442,820
Small Arms Ammunition:				
Foreign Countries ..	..	8,634	..	56,474
British Possessions ..	..	39,200	..	198,394
Total	..	47,834	..	254,868
Fuses, Tubes, Primers, &c.:				
Foreign Countries ..	..	863	..	22,696
British Possessions ..	..	944	..	16,970
Total	..	1,807	..	39,576
Rockets and other Combustibles for Warlike Purposes, Explosives, and Ammunition, Unenumerated:				
Foreign Countries ..	..	..	..	38,843
British Possessions ..	..	..	..	143,180
Total	..	..	..	182,023
Beer and Ale:	Barrels.	Barrels.		
Foreign Countries ..	150,564	141,312	544,171	521,275
British Possessions ..	360,279	381,377	1,216,381	1,261,623
Total	510,843	522,689	1,760,552	1,782,898
Blackening and Polishes:	Cwts.	Cwts.		
Foreign Countries ..	117,001	131,666	63,267	78,809
British Possessions ..	45,248	65,892	66,071	95,229
Total	162,249	197,558	129,338	174,038

General Exports—cont.

Articles, and Countries to which Exported.	Quantities.		Value.	
	1900.	1901.	1900.	1901.
Candles:	Lb.	Lb.	£	£
Foreign Countries ..	11,090,400	11,090,560	195,256	195,322
British Possessions ..	11,495,100	13,496,000	202,882	236,392
Total	22,585,500	24,586,560	398,138	431,714
Caoutchouc, Manufactures of:				
Foreign Countries ..	..	..	1,109,416	886,818
British Possessions ..	..	..	314,048	375,597
Total	..	..	1,423,464	1,262,415
Cement for Building and Engineering Purposes:	Tons	Tons		
Foreign Countries ..	147,573	95,276	£76,354	187,642
British Possessions ..	212,371	210,955	396,898	396,332
Total	359,944	305,331	673,162	583,974
Chemicals and Chemical Preparations:				
Alkali:	Cwts.			
Foreign Countries ..	2,905,530	..	884,562	..
British Possessions ..	750,400	..	234,857	..
Total	3,655,700	..	1,119,449	..
Aluminous Sulphates (including Alum):		Cwts.		
Foreign Countries ..	..	55,826	..	13,273
British Possessions ..	..	103,901	..	22,363
Total	..	159,727	..	35,636
Bleaching Materials:	Cwts.			
Foreign Countries ..	1,204,700	..	343,052	..
British Possessions ..	62,700	..	26,138	..
Total	1,267,400	..	369,190	..
Bleaching Powder:		Cwts.		
Foreign Countries ..	..	974,000	..	818,660
British Possessions ..	..	57,100	..	22,120
Total	..	1,031,100	..	340,780
Other Bleaching Materials:				
Foreign Countries ..	..	100	..	25
British Possessions ..	..	3,200	..	1,720
Total	..	3,300	..	1,745
Calcium Carbide:	Cwts.	Cwts.		
Foreign Countries ..	31	..	57	..
British Possessions ..	66	7	132	14
Total	97	7	189	14
Copper Sulphate:	Tons.	Tons.		
Foreign Countries ..	42,186	35,458	996,383	833,674
British Possessions ..	714	567	16,817	12,643
Total	42,900	36,025	1,013,200	846,317
Dyestuffs:				
Products of Coal Tar:				
Foreign Countries ..	..	..	197,297	195,521
British Possessions ..	..	..	18,157	14,828
Total	..	..	210,454	210,349
Other Sorts, Unenumerated:				
Foreign Countries ..	..	..	96,577	98,123
British Possessions ..	..	..	30,064	31,581
Total	..	..	126,641	129,704
Saltpetre, British Prepared:	Cwts.	Cwts.		
Foreign Countries ..	18,177	19,260	19,390	20,430
British Possessions ..	6,501	6,535	6,976	6,903
Total	24,678	25,795	26,366	27,333

General Exports—cont.

Articles, and Countries to which Exported.	Quantities.		Value.	
	1900.	1901.	1900.	1901.
Chemicals—cont.				
Soda Compounds:				
Soda Ash:		Cwts.	£	£
Foreign Countries ..	..	1,060,120	..	235,110
British Possessions ..	..	227,880	..	46,922
Total	..	1,288,000	..	282,032
Soda, Caustic:				
Foreign Countries ..	..	914,303	..	449,661
British Possessions ..	..	201,962	..	102,517
Total	..	1,116,235	..	552,173
Soda, Bicarbonate:				
Foreign Countries ..	..	140,597	..	48,144
British Possessions ..	..	152,917	..	53,765
Total	..	293,514	..	101,909
Soda, Crystals:				
Foreign Countries ..	..	128,850	..	21,013
British Possessions ..	..	66,295	..	11,362
Total	..	195,145	..	32,405
Soda, Sulphate (Salt-cake):				
Foreign Countries ..	..	570,596	..	43,094
British Possessions ..	..	3,970	..	539
Total	..	574,566	..	43,633
Soda, other Sorts:				
Foreign Countries ..	..	219,643	..	97,076
British Possessions ..	..	39,314	..	16,318
Total	..	258,963	..	113,394
Not otherwise Enumerated:				
Foreign Countries ..	..	..	1,806,033	1,514,520
British Possessions ..	..	..	946,388	986,084
Total	..	..	2,752,421	2,500,604
Coal, Coke, &c.:				
Coal and Cullm:		Tons.		
Foreign Countries ..	41,373,996	39,350,557	33,761,785	26,578,607
British Possessions ..	2,715,201	2,526,524	2,647,829	2,166,377
Total	44,089,197	41,877,081	36,409,614	28,744,984
Coke and Cinders				
Foreign Countries ..	910,625	750,018	1,096,004	631,708
British Possessions ..	74,740	57,653	119,732	69,078
Total	985,365	807,671	1,215,736	700,786
Fuel, Manufactured:				
Foreign Countries ..	991,140	1,005,717	960,331	813,669
British Possessions ..	32,526	75,443	34,175	75,369
Total	1,023,666	1,081,160	994,506	888,978
Products of Coal:				
Foreign Countries ..	..	..	1,653,755	1,073,714
British Possessions ..	..	..	157,889	77,539
Total	..	..	1,811,644	1,151,253
Corn, Grain, Meal and Flour:				
Malt:				
Foreign Countries ..	37,428	48,695	64,730	87,722
British Possessions ..	91,592	111,920	177,032	219,206
Total	129,020	160,615	241,762	306,928
Crucibles, Plumbago:				
Foreign Countries ..	54,334	41,791	97,781	78,098
British Possessions ..	4,029	4,261	9,460	8,765
Total	58,363	46,052	107,241	86,863
Earthen and China Ware:				
Red Pottery and Brown Stone Ware, and Clay Manufactures (except Bricks):				
Foreign Countries ..	..	..	124,366	118,174
British Possessions ..	..	..	62,017	60,404
Total	..	..	186,383	178,578

General Exports—cont.

Articles, and Countries to which Exported.	Quantities.		Value.	
	1900.	1901.	1900.	1901.
Earthen and China Ware—cont.				
Earthenware, China-ware, Parian, and Porcelain:				
Foreign Countries ..	..	..	£ 1,193,898	£ 1,050,270
British Possessions ..	..	..	657,725	753,949
Total	..	..	1,851,623	1,814,219
Glass:				
Plate, Rough, or Silvered:	Sq. Ft.	Cwts.		
Foreign Countries ..	597,800	17,058	44,823	27,075
British Possessions ..	1,563,000	49,777	90,595	88,242
Total	2,160,800	66,835	135,418	115,317
Flint, Plain, Cut, or Ornamented (including Bottles, and other Manufactures of Flint Glass):				
Foreign Countries ..	Cwts. 32,859	Cwts. 32,392	102,904	100,676
British Possessions ..	65,116	71,109	141,736	149,899
Total	97,975	103,501	244,640	250,575
Bottles and Manufactures of Green or Common Glass:				
Foreign Countries ..	235,324	221,616	116,182	111,855
British Possessions ..	627,860	659,889	305,025	326,962
Total	863,184	881,505	421,207	438,817
Other Manufactures, Unenumerated:				
Foreign Countries ..	118,247	116,714	126,814	136,187
British Possessions ..	106,572	114,360	105,526	116,259
Total	224,819	231,074	232,340	252,446
Glue, Size, and Gelatine:				
Foreign Countries ..	98,085	103,486	95,501	102,306
British Possessions ..	30,193	16,846	32,383	30,206
Total	128,283	120,332	127,884	132,512
Grease, Tallow, and Animal Fat:				
Foreign Countries ..	568,002	606,969	720,601	763,432
British Possessions ..	39,777	60,469	37,962	57,346
Total	607,779	667,438	758,563	820,778
Hides, Raw:				
Foreign Countries ..	123,187	124,200	229,070	217,805
British Possessions ..	33,015	45,897	81,418	112,556
Total	161,182	170,097	310,488	330,361
Hops:				
Foreign Countries ..	5,186	4,995	16,553	15,124
British Possessions ..	9,813	13,197	46,973	64,451
Total	14,999	18,192	63,526	79,575
Instruments and Apparatus, Surgical, Anatomical, and Scientific:				
Foreign Countries ..	..	..	247,733	258,584
British Possessions ..	..	..	200,788	244,207
Total	..	..	448,521	502,791
Leather:				
Foreign Countries ..	..	..	1,743,096	1,586,877
British Possessions ..	..	..	1,655,164	1,919,791
Total	..	..	3,398,260	3,506,668
Manure:				
Sulphate of Ammonia:				
Foreign Countries ..	Tons. 118,582	Tons. 132,353	1,450,655	1,419,775
British Possessions ..	16,575	17,531	186,023	187,401
Total	145,157	149,884	1,636,678	1,607,176



General Exports—cont.

Articles, and Countries to which Exported.	Quantities.		Value.	
	1900.	1901.	1900.	1901.
Manure—cont.				
Other Descriptions :	Tons.	Tons.	£	£
Foreign Countries ..	191,218	212,792	527,848	547,607
British Possessions ..	63,638	64,448	243,764	242,728
Total	254,856	277,238	771,612	790,335
Margarin and all Artificial Butters :				
Foreign Countries ..	Cwts.	Cwts.	£	£
British Possessions ..	1,442	2,887	5,232	6,199
British Possessions ..	1,591	1,535	3,979	3,858
Total	3,033	4,422	7,111	10,057
Matches :				
Safety :	Gross Boxes.	Gross Boxes.		
Foreign Countries ..	8,600	7,100	1,175	1,033
British Possessions ..	87,400	59,600	7,728	6,290
Total	96,000	66,700	8,903	7,323
Other Descriptions :				
Foreign Countries ..	37,900	53,300	8,677	9,201
British Possessions ..	634,200	732,800	81,288	91,251
Total	692,100	786,100	89,965	100,452
Medicines, comprising Drugs and Medical Preparations :				
Foreign Countries ..	..	..	403,569	425,917
British Possessions ..	..	..	854,116	914,053
Total	..	..	1,262,685	1,339,970
Metals, and Manufactures thereof :				
Brass, and Manufactures of, not being Ordnance :				
Foreign Countries ..	Cwts.	Cwts.	£	£
British Possessions ..	73,887	66,858	363,794	312,221
British Possessions ..	46,901	49,381	267,221	280,780
Total	120,788	116,239	631,015	593,001
Copper :				
Ore, Total	Tons.	Tons.	£	£
	11	114	70	910
Unwrought, in Ingots, Cakes, or Slabs, and Precipitate :				
Foreign Countries ..	Cwts.	Cwts.	£	£
British Possessions ..	334,271	522,804	1,372,533	1,921,940
British Possessions ..	6,455	8,405	24,957	30,404
Total	360,726	531,209	1,397,490	1,952,344
Wrought, Mixed or Yellow Metal :				
Foreign Countries ..	47,903	42,196	168,857	142,690
British Possessions ..	127,506	139,914	413,273	447,145
Total	175,409	182,110	582,130	589,835
Wrought, Unenumerated :				
Foreign Countries ..	143,319	142,792	637,906	615,454
British Possessions ..	68,596	76,810	304,313	332,120
Total	211,915	219,602	942,219	947,574
Lead :				
Ore :				
Foreign Countries ..	Tons.	Tons.	£	£
British Possessions ..	1,482	2,278	14,046	18,220
British Possessions ..	..	41	..	628
Total	1,482	2,319	14,046	18,848
Pig :				
Foreign Countries ..	16,802	15,217	295,252	201,889
British Possessions ..	677	2,929	12,012	38,487
Total	17,479	18,146	307,264	240,376
Manufactures :				
Foreign Countries ..	6,587	5,896	128,146	96,522
British Possessions ..	11,923	13,533	254,350	248,647
Total	18,510	19,429	382,496	345,169
Tin, Unwrought :				
Foreign Countries ..	Cwts.	Cwts.	£	£
British Possessions ..	103,147	101,514	700,045	627,131
British Possessions ..	9,242	8,405	62,719	52,333
Total	112,389	109,919	762,764	679,464

General Exports—cont.

Articles, and Countries to which Exported.	Quantities.		Value.	
	1900.	1901.	1900.	1901.
Metals—cont.				
Zinc or Spelter :				
Ore, Total	Tons.	Tons.	£	£
	13,689	13,761	41,554	35,316
Crude, in Cakes :				
Foreign Countries ..	Cwts.	Cwts.	£	£
British Possessions ..	89,469	90,813	85,402	70,079
British Possessions ..	50,963	57,262	44,722	38,322
Total	140,412	148,075	130,124	108,401
Manufactures of :				
Foreign Countries ..	5,513	5,245	9,195	8,628
British Possessions ..	17,295	19,481	27,526	27,965
Total	22,808	24,726	36,721	36,593
Unenumerated :				
Foreign Countries ..	..	..	625,863	600,629
British Possessions ..	..	..	213,325	237,815
Total	..	..	839,188	838,444
Methylic Alcohol, not purified so as to be potable :				
Foreign Countries ..	Gallons.	Gallons.	£	£
British Possessions ..	3,902	1,304	493	248
British Possessions ..	12,750	4,799	1,583	735
Total	16,652	6,103	2,076	983
Mica and Talc :				
Foreign Countries ..	Cwts.	Cwts.	£	£
British Possessions ..	1,384	1,348	9,068	9,069
British Possessions ..	10	19	202	118
Total	1,394	1,367	9,270	9,187
Milk, Condensed :				
Foreign Countries ..	38,082	23,398	70,354	42,573
British Possessions ..	171,365	183,732	320,205	341,911
Total	209,447	207,130	390,559	384,484
Oil, other than Essential, or Medicinal :				
Seed, Lined :				
Foreign Countries ..	Tons.	Tons.	£	£
British Possessions ..	9,742	9,551	290,333	293,008
British Possessions ..	9,952	11,473	298,533	368,442
Total	19,694	21,024	588,866	661,450
Cotton :				
Foreign Countries ..	19,197	17,640	418,348	380,216
British Possessions ..	428	256	10,056	6,191
Total	19,625	17,896	428,404	386,407
Other Seed Oils :				
Foreign Countries ..	2,931	3,243	81,141	96,308
British Possessions ..	687	703	16,573	19,507
Total	3,618	3,946	97,714	115,815
Other Sorts, Unenumerated :				
Foreign Countries ..	..	..	363,921	653,977
British Possessions ..	..	..	111,467	183,220
Total	..	..	475,388	837,197
Oil and Floor-Cloth :				
Foreign Countries ..	Sq. Yds.	Sq. Yds.	£	£
British Possessions ..	16,729,100	16,562,700	783,766	777,143
British Possessions ..	11,117,360	19,195,200	529,067	520,864
Total	27,846,460	26,757,900	1,312,833	1,298,007
Oil Seed Cake and other Animal Foods, Unenumerated :				
Foreign Countries ..	Tons.	Tons.	£	£
British Possessions ..	45,096	50,086	192,067	215,533
British Possessions ..	1,034	4,178	8,269	21,279
Total	46,130	54,264	200,336	236,812
Oleo-margarin :				
Foreign Countries ..	Cwts.	Cwts.	£	£
British Possessions ..	9,482	9,003	16,803	16,811
British Possessions ..	..	20	..	46
Total	9,482	9,023	16,803	16,857

General Exports—cont.

Articles, and Countries to which Exported.	Quantities.		Value.	
	1900.	1901.	1900.	1901.
Painters' Colours and Materials, Unenumerated:	Cwts.	Cwts.	£	£
Foreign Countries...	..	..	1,104,436	1,029,438
British Possessions..	..	..	949,509	978,545
Total	..	..	2,053,945	2,007,983
Paper:				
Writing or Printing, and Envelopes:				
Foreign Countries...	219,312	182,411	365,118	325,147
British Possessions...	537,634	534,446	758,637	770,131
Total	756,976	716,857	1,123,755	1,095,278
Hangings:				
Foreign Countries...	24,704	23,286	83,249	83,186
British Possessions...	39,530	46,051	87,127	111,615
Total	64,234	69,337	170,376	194,801
Pasteboard, Millboard, Cardboard, and Cards:				
Foreign Countries...	7,630	6,844	13,637	17,204
British Possessions...	30,576	35,041	47,674	57,879
Total	38,206	41,885	61,311	75,083
Paraffin-Wax:				
Foreign Countries...	..	220,357	..	288,952
British Possessions...	..	5,904	..	7,235
Total	..	226,261	..	296,187
Perfumery (except Spirits Perfumed in Bond):				
Foreign Countries...	..	..	45,396	43,658
British Possessions...	..	..	84,704	87,949
Total	..	..	130,100	131,607
Plated and Gilt Wares:				
Foreign Countries...	..	..	138,518	139,676
British Possessions...	..	..	266,515	310,364
Total	..	..	405,033	441,040
Rags (except Woollen) and other Materials for making Paper:	Tons.	Tons.		
Foreign Countries...	60,080	63,615	363,333	372,811
British Possessions..	2,178	1,543	11,942	9,850
Total	62,258	65,158	375,275	382,670
Salt, Rock and White:				
Foreign Countries...	228,471	230,915	189,426	199,546
British Possessions..	318,924	386,288	267,914	309,594
Total	547,395	617,203	457,340	509,140
Soap:	Cwts.	Cwts.		
Foreign Countries..	315,034	360,318	345,385	370,820
British Possessions..	559,180	587,167	594,125	628,704
Total	874,214	947,485	939,510	999,524
Spirits:				
British and Irish, Methylated:	Proof Gallons.	Proof Gallons.		
Foreign Countries..	282	873	43	117
British Possessions..	11,111	13,427	1,054	1,374
Total	11,393	14,300	1,097	1,491
Foreign, Methylated in the United Kingdom, Total..	1,871	20	191	4
Perfumed in Bond:	Gallons.	Gallons.		
Foreign Countries..	10,450	10,110	38,004	33,995
British Possessions..	11,081	12,565	31,760	32,749
Total	21,531	22,675	69,764	71,744
Starch and Blue:	Cwts.	Cwts.		
Foreign Countries..	41,737	40,634	57,662	60,916
British Possessions..	66,965	63,324	101,045	96,662
Total	108,702	103,958	158,710	157,578

General Exports—cont.

Articles, and Countries to which Exported.	Quantities.		Value.	
	1900.	1901.	1900.	1901.
Sugar:				
Refined and Candy:	Cwts.	Cwts.	£	£
Foreign Countries..	396,836	259,871	246,032	161,479
British Possessions..	209,517	296,438	135,701	189,282
Total	606,353	556,309	381,733	350,761
Molasses, Treacle, Syrup and Glucose:				
Foreign Countries..	198,164	171,344	79,262	78,939
British Possessions..	40,808	57,207	59,575	56,585
Total	238,972	228,551	118,837	135,554

PATENT LAW AMENDMENT BILL.

The following are the clauses of the Patent Law Amendment Bill (1902) as amended by the Standing Committee on Trade, &c.

Below will be found a further clause added at the third reading of the Bill.

"Be it enacted by the King's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

1.—(1) Where an application for a patent has been made and a complete specification has been deposited by the applicant, the examiner shall forthwith, in addition to the inquiries which he is directed to make by the Patents, Designs, and Trade Marks Act, 1883 (in this Act referred to as the principal Act), make a further investigation for the purpose of ascertaining whether the invention claimed has been wholly or in part claimed or described in any specification (other than a provisional specification not followed by a complete specification) published before the date of the application, and deposited in the Patent Office pursuant to any application for a patent made in the United Kingdom within fifty years next before the date of the application.

(2) If on investigation it appears that the invention has been wholly or in part claimed or described in any such specification, the applicant shall be informed thereof, and the applicant may, within such time as may be prescribed, amend his specification, and the amended specification shall be investigated in like manner as the original specification.

(3) The examiner shall report to the comptroller the result of his investigations in such manner as the Board of Trade may direct.

(4) The provisions of sub-section five of section nine of the principal Act, as amended by any subsequent enactment, shall apply to reports under this section.

(5) If the comptroller is satisfied that no objection exists to the specification on the ground that the invention claimed thereby has been wholly or in part claimed or described in a previous specification as before mentioned, he shall, in the absence of any other lawful ground of objection, accept the specification.

(6) If the comptroller is not so satisfied, he shall, after hearing the applicant, and unless the objection be removed by amending the specification to the satisfaction of the comptroller, determine whether a reference to any, and, if so, what, prior specification ought to be made in the specification by way of notice to the public.

(7) An appeal shall lie from the decision of the comptroller under this section to the law officer.

(8) Section eight of the principal Act and section three of the Patents, Designs, and Trade Marks (Amendment) Act, 1885 (which regulate the time for depositing a complete specification), shall have effect as if references therein to the period of nine months were references to the period of six months.

(9) The investigations and reports required by this section shall not be held in any way to guarantee the validity of any patent, and no liability shall be incurred by



the Board of Trade or any officer thereof by reason of, or in connection with, any such investigation or report, or any proceeding consequent thereon.

(10) An invention shall not be deemed to have been anticipated by reason only of its publication in a specification deposited in the Patent Office pursuant to an application made not less than 50 years before the date of the application for a patent therefor, or of its publication in a provisional specification of any date not followed by a complete specification.

(11) The Board of Trade, with the sanction of the Treasury, may prescribe an additional fee not exceeding one pound in respect of the investigation mentioned in this section, which shall be payable on the sealing of the patent.

(12) This section shall come into operation at such date as the Board of Trade may by order direct, and shall apply only to applications made after that date and to the inventions in respect of which such applications are made, and the order shall be laid before both Houses of Parliament.

2. Section twenty-two of the principal Act (relating to the grant of compulsory licences by the Board of Trade) is hereby repealed, and the following provisions shall be substituted therefor:—

(1) Any person interested may present a petition to the Board of Trade alleging that the reasonable requirements of the public with respect to a patented invention have not been satisfied, and praying for the grant of a compulsory licence, or, in the alternative, for the revocation of the patent;

(2) The Board of Trade shall consider the petition, and if the parties do not come to an arrangement between themselves, the Board of Trade, if satisfied that a *prima facie* case has been made out, shall refer the petition to the Judicial Committee of the Privy Council, and if the Board are not so satisfied, they may dismiss the petition;

(3) Where any such petition is referred by the Board of Trade to the Judicial Committee, and it is proved to the satisfaction of the Judicial Committee that the reasonable requirements of the public with reference to the patented invention have not been satisfied, the Judicial Committee may order the patentee to grant licences on such terms as they may think just, or if the Judicial Committee are of opinion that the reasonable requirements of the public will not be satisfied by the grant of licences, they may, by order, revoke the patent;

Provided that no order of revocation shall be made before the expiration of three years from the date of the patent, or if the patentee gives satisfactory reasons for his default;

(4) On the hearing of any petition under this section, the patentee, and any person claiming an interest in the patent as exclusive licensee or otherwise, shall be made parties to the proceeding, and the law officer, or such other counsel as he may appoint, shall be entitled to appear and be heard;

(5) If it is proved to the satisfaction of the Judicial Committee that the patent is worked or that the patented article is manufactured exclusively or mainly outside the United Kingdom, then, unless the patentee can show that the reasonable requirements of the public have been satisfied, the petitioner shall be entitled either to an order for a compulsory licence or, subject to the above proviso, to an order for the revocation of the patent;

(6) For the purposes of this section, the reasonable requirements of the public shall not be deemed to have been satisfied if, by reason of the default of the patentee to work his patent or to manufacture the patented article in the United Kingdom to an adequate extent, or to grant licences on reasonable terms, (a) any existing industry or the establishment of any new industry is unfairly prejudiced, or (b) the demand for the patented article is not reasonably met;

(7) An order of the Judicial Committee granting any licence under this section shall, without prejudice to

any other method of enforcement, operate as if it were embodied in a deed made between the parties to the proceeding;

(8) The Judicial Committee may make rules of procedure and practice for regulating proceedings under this section, and subject thereto, such proceedings shall be regulated according to the existing procedure and practice in patent matters. Any order made by the Judicial Committee may be enforced as if it were an order of the High Court.

(9) The costs of and incidental to all proceedings under this section shall be in the discretion of the Judicial Committee, but in awarding costs on any application for the grant of a licence the Judicial Committee may have regard to any previous request for, or offer of, a licence made either before or after the application to the Committee;

(10) This section shall apply to patents granted before as well as after the commencement of this Act.

3. In subsection four of section eighty-two of the principal Act (which relates to the performance of the duties of the comptroller by other officers under the direction of the Board of Trade) the words "in his absence" shall be repealed.

4.—(1) This Act may be cited as the Patents Act, 1902, and may be cited and shall be construed as one with the Patents, Designs, and Trade Marks Acts, 1883 to 1901.

(2) It shall, except as otherwise provided therein, come into operation on the first day of January one thousand nine hundred and three."

PATENT LAW AMENDMENT BILL.

Times, Oct. 22, 1902.

On consideration of this Bill as amended by the standing committee,

Mr. CALDWELL (Lanark, Mid) moved the following new clause:—"An invention covered by any patent granted on an application to which section one of this Act applies shall not be deemed to have been anticipated by reason only of its publication in a specification deposited in the Patent Office pursuant to an application made not less than 50 years before the date of the application for a patent therefor, or of its publication in a provisional specification of any date not followed by a complete specification."

Mr. GERALD BALFOUR (Leeds, Central) accepted the clause, which was agreed to.

On clause 2,

Mr. CAWLEY (Lancashire, Prestwich) moved an amendment, the effect of which, he said, would be to enable the Board of Trade not only to dismiss petitions for patents or to refer them to the Judicial Committee of the Privy Council, but to grant them outright, a course, which under the present law they were not empowered to take. His amendment was designed in the interests especially of the small manufacturers in the aniline-colour trade. That trade had been largely transferred to Germany mainly, he contended, owing to the operation of the Patent Laws of this country.

Mr. BRIGG supported the amendment on the ground that anything that could be done to help the small inventor, so that the industry of the country might be promoted, deserved the consideration of the Board of Trade.

Mr. GERALD BALFOUR said that the particular modification desired by the hon. member for Prestwich was very fully discussed in the committee upstairs and rejected, as he thought, for excellent reasons. What the Bill proposed was that applications should, in the first instance, be made to the Board of Trade, who could then act the part of conciliator between the patentee and those who were seeking for a licence. If the parties were unable to come to an agreement with the assistance of the Board of Trade, the Board of Trade might, if in its opinion there was a *prima facie* case, refer the petition to the Privy Council, and the Privy Council decided at once and for all. Until the petition was referred to the Privy Council no expense of any kind was involved upon either of the parties, but he imagined that, in the case of the small manufacturers of whom the hon. member spoke, it would be possible for the Board of Trade to bring the parties together in the majority

of instances at all events. The effect of the hon. member's scheme, if it were carried, would be this. The Board of Trade would not accept the task of deciding upon matters in which very great pecuniary interests were constantly involved without referring them to a tribunal constituted *ad hoc*. There would be an abatement, whose expenses would have to be paid, and there would be the expenses of counsel, and the result would be that, where a case was carried from the decision of the Board of Trade to the Privy Council, so far from the expenses being diminished, they would be doubled. The object of the amendments which the Government introduced into the Bill in committee was to diminish the expenses as far as possible, and with that view they had arranged that there should be only one trial of these matters before a Court, and that from that Court there should be no appeal. He believed they could not get a better Court for the purpose than the Privy Council, and it was for that reason the Government substituted the Privy Council for the High Court. His own belief was that under the procedure which the Bill now contemplated they would get at once the cheapest and most satisfactory procedure available.

Mr. CALDWELL thought the Board of Trade should take upon itself the responsibility of giving a decision when there would be, if the necessity arose, an appeal to the Privy Council. The probability, however, was that the parties would come to an agreement before the Board of Trade.

The amendment was negatived without a division.

The Bill was then read a third time.

DUTY-FREE SPIRIT FOR INDUSTRIAL PURPOSES.

The following is the clause in the Finance Act of 1902 which gives power to authorise the use of spirits, without payment of duty, in arts or manufactures:—

Clause 8.—(1) Where, in the case of any art or manufacture carried on by any person in which the use of spirits is required, it shall be proved to the satisfaction of the Commissioners of Inland Revenue that the use of methylated spirits is unsuitable or detrimental, they may, if they think fit, authorise that person to receive spirits without payment of duty for use in the art or manufacture upon giving security to their satisfaction that he will use the spirits in the art or manufacture, and for no other purposes, and the spirits so used shall be exempt from duty:

Provided that foreign spirits may not be so received or used until the difference between the duty of customs chargeable thereon and the duty of excise chargeable on British spirits has been paid.

(2) The authority shall only be granted subject to a compliance with such regulations as the Commissioners may require the applicant to observe for the security of the revenue, and upon condition that he will, to the satisfaction of the Commissioners if so required by them, render the spirits upotable before and during use, and will from time to time pay any expenses that may be incurred in placing an officer in charge of his premises.

(3) If any person so authorised shall not comply with any regulation which he is required to observe, he shall, in addition to any other fine or liability, incur a fine of fifty pounds.

IMPORTS OF JAPAN IN 1901.

U.S. Cons. Reps., Sept. 9, 1902.

Steel, Iron, &c.—In brass and copper tubes, mercury and nickel, Great Britain has the bulk of the trade, and the United States is losing ground in all except mercury. The imports of lead have steadily increased for several years, and the proportion of the United States has grown, until last year it amounted to five-eighths of the whole.

Oil.—Nearly all the kerosene oil, lubricating oil, and paraffin-wax imported comes from America, whilst Great Britain furnishes most of the linseed oil. The importation of kerosene oil continues to increase, although it is believed that good petroleum veins exist in some parts of this and the northern island, and the Japanese are making constant efforts to extend the domestic production. Since 1899, there has been a gradual absorption of the smaller companies by the Takerada Oil Co., which now claims to have

the greatest and richest area of oil fields, although the International surpasses it in thoroughness of equipment and in command of capital. The Takerada, which operates chiefly in Echigo Province, commands oil-fields covering an area of 27,900 acres, in which are over 200 wells and boring machines, with a daily output of 52,000 galls. There are now only three important oil companies in Japan.

Sugar.—Hong Kong and Germany together furnish nearly half the sugar imported, and the other half is brought from many countries, among which Austria-Hungary, China, the Dutch Indies, and the Philippine Islands are the most important. The Philippines increased their shipments by about 50 per cent., as compared with 1900. This market for sugar is growing, and with the establishment of more settled conditions in the Philippines, the industry should be so developed as to supply half the demand here. The islands now supply about one-ninth, none of which is refined.

Paper.—More than half the fancy glazed paper, match-paper, and packing-paper imported into Japan comes from Germany, the United States doing very little in these lines. Great Britain leads in printing paper, with the United States and Austria-Hungary not far behind, the three together furnishing more than three-fourths of the entire importation. There are 11 paper factories in Japan, which are steadily increasing their output, amounting this year to 103,926,000 lb.; whilst the total importation, which was less than half as much as last year, was 17,359,000 lb. The native factories have formed an alliance to control prices, with a view to check sharp fluctuations. They do not produce ornamental paper, but manufacture printing-paper, board-paper, and wrapping-paper, and the exportations of these almost equal in value the importations of paper of all kinds.

Alcohol.—About four-fifths of the alcohol imported last year came from America, this being the first year that she has been in the lead in this article.

Leather.—The United States still keeps the lead in sole-leather, of which it furnishes about three-fourths, but in sales of other leather it is falling back. The total import of sole leather, for 1900, decreased by 800,000 lb., and that of hides and skins increased an equal amount, whilst other leather gained a very little.

II.—FUEL, GAS, AND LIGHT.

PEAT DEVELOPMENT IN ONTARIO.

U.S. Cons. Rep., Sept. 22, 1902.

Large sums have been expended during the past few years in experiments for the perfection of machinery to turn out a fuel that will compete with coal. The Victoria Road peat plant, near Lindsay, Ontario, has alone spent 60,000 dols. during the past year in completing its machinery, but the result is not yet satisfactory.

The Ellice Peat Co. have added a new machine known as an artificial drier. Under the old process, the bog was cut and sun-dried. With the new machine, the crude peat is run through the apparatus as fast as dug from the bog. Part of the moisture is evaporated by the heat of the process, and the balance removed by the immense pressure the material undergoes, until it drops from the machine in cubes, ready for the market. This process of converting the raw material into marketable fuel is a great improvement over the old method, but further improvements are expected.

The whole question of making the inexhaustible beds of bog commercially valuable lies in the drying process.

Thus far, the nearest solution to the problem lies probably in the machine invented by Mr. Dobson, now in use at his peat works at Beaverton, near Lake Simcoe, in northern Ontario. This machine cuts, pulverises, and spreads the material at the same time. This reduces the moisture 50 per cent., and the balance is taken out by the drying process. The machinery in operation at this plant has a capacity of 20 tons a day. The bogs are three miles from a railroad, and yet the demand for the fuel is such that it brings 3.25 dols. a ton at the plant and is retailed at Toronto at



4.25 dols. The plant near Stratford now has a daily capacity of 25 tons, and a ready sale for all the fuel it can produce. It is run night and day, with a view to supply the demand caused by the scarcity of hard coal.

Canada annually consumes nearly 3,000,000 tons of anthracite coal, all of which comes from Pennsylvania. The prolonged strike has changed the situation to such an extent that this summer no coal was delivered, and a serious fuel famine confronts the people of this latitude. This condition of affairs has given a tremendous impetus to the manufacturing of peat for fuel all over the province, and will probably lead to the perfection of inventions.

III.—TAR PRODUCTS, PETROLEUM, Etc.

COAL TAR PRODUCTION IN THE UNITED STATES.*

Eng. and Mining J., Sept. 20, 1902.

The recovery of coal-tar as a by-product in the manufacture of illuminating gas and coke in the United States has assumed very large proportions, and a large proportion of the total is furnished by the by-product coke ovens, the output of which, in 1899, amounted to 52,344 short tons. The recovery of tar in illuminating-gas manufacture, in 1900, is computed as follows:—The total production of gas was 67,093,553,471 cb. ft., of which upwards of 75 per cent. was water-gas. Reckoning the make of coal-gas at 20 per cent. of the total, its quantity was 13,418,710,694 cb. ft. The average yield per ton of coal being 10,000 cb. ft., there must have been consumed for this purpose 1,341,871 tons of coal. The yield of tar per ton of coal is, approximately, 5 per cent. by weight, which would indicate a recovery of 67,094 tons of tar. The quantity of water-gas tar is computed from the quantity of oil consumed, which was 194,857,296 galls. About 25 per cent. of the oil consumed is recovered as tar, corresponding to 48,714,324 galls., which is equivalent to 222,868 tons, a gallon of this weighing 9.15 lb. (sp. gr. 1.1). The total production of coal tar and water-gas tar in 1900 was therefore 342,306 tons. The quantity of coal tar reported as consumed in the United States, in 1900, was 22,004,650 galls., which, at 10 lb. per gallon, gives 110,023 tons.

PETROLEUM INDUSTRY OF NEW BRUNSWICK.

Ed. of Trade J., Oct. 2, 1902.

According to *The B.C. Review* of 27th ult., the petroleum industry in New Brunswick is likely to assume considerable importance in the near future. The New Brunswick Petroleum Co. has already sunk 14 wells, the majority of which have been sunk to a distance of between 400 ft. and 500 ft., but two have been pushed through the first oil sands, and have reached a depth of 1,450 ft. The company is prepared to erect a refinery which will have a capacity of 400 barrels a day. For the present, the company will confine its operations to extracting the naphtha and benzoline, and making burning- and lubricating- oils. The residuum, being more costly to treat, will not be dealt with for the present. The charter of this company gives it practically the control of all the oil-bearing territory in the province, but in return for these powers the company has to spend 20,000*l.* in development during the first five years.

VII.—ACIDS, ALKALIS, Etc.

POTASH INDUSTRY IN GERMANY.

U.S. Cons. Reps., Sept. 25, 1902.

The potash industry has suddenly lapsed into a critical condition. Several of the more important mining companies have reduced the wages of their working people from 10 to 30 per cent. The Prussian Fiskus, which controls an important group of mines in Prussian Saxony, has discharged 350 to 400 workmen, and the Solvay works at Bernburg have done the same, until a mass meeting of working people was called to solicit the intervention of the

local government against further dismissals. When it is remembered that, down to the end of April last, all the producing potash mines were running up to their full capacity, many even employing Sunday and night shifts, in order to keep pace with the demand, this sudden depression would seem to be due to some special cause.

The effect of the recent negotiations (see this Journal, Sept. 15, 1161) has been to make the syndicate unstable; its productive capacity now exceeds the requirements of the market at syndicate prices. This has not only disappointed the hopes of the newly-admitted members of the syndicate, but has compelled some of the old ones to restrict their output, discharge some of their workmen, and, in some cases at least, to reduce the wages of those who are retained.

BROMINE PRODUCTION IN THE UNITED STATES.

Eng. and Mining J., Sept. 27, 1902.

The production of bromine in the United States, during 1901, amounted to 552,043 lb., valued at 154,572 dols., as compared with 521,444 lb., in 1900, valued at 140,790 dols., an increase of 30,599 lb., in quantity, and 13,782 dols., in value, for the year. The price per lb., during 1901 averaged 28 cents, as compared with 27 cents, in 1900, and 29 cents, in 1899. The production of bromine in the world continues to be controlled by the Associated American Producers and by the Leopoldshall-Stassfurt Convention, which is operative for several years to come.

CHEMICAL INDUSTRIES OF LYONS (FRANCE).

Foreign Office Miscellaneous Series, No. 582.

The chemical industry was especially affected by the high price of native coal in 1901. The fall in the price of British coal, which took place in 1901, had no effect on the price of native coal until towards the end of 1901; this, taken in conjunction with the general industrial crisis and the decrease of demand from the United Kingdom, explains the poverty of the situation.

Soda.—The consumption of soda for the department of the Rhône, which had fallen away in 1900, went back to the figure reached in 1899, namely, 13,000 tons.

The sale of carbonate of soda (Solvay), coming from the East, appears to be increasing to the detriment of the soda factories of St. Fous, which follow the Leblanc system.

Sulphuric Acid.—The production of sulphuric acid has decreased throughout the whole of France. This is evident proof of the general decrease of chemicals in which sulphuric acid largely figures.

The extraction of pyrites at Sain-Bel, which, in 1899, amounted to 317,000 tons, fell, in 1900, to 304,000 tons; of this quantity, 52,000 tons were for export.

The import has increased from 4,253 tons in 1900, to 5,385 tons in 1901. This amount is insignificant, considering that the total French production is 500,000 tons, and probably is, in most part, composed of concentrated acids.

Chemical Manures.—The extreme cheapness of wine in the South of France has had the effect of almost suspending the purchase of manure in the wine-growing districts. At the same time, the fall in the price of sugar has diminished beetroot cultivation. The manufacturers of chemical manures have therefore suffered to some extent. The excess of importation over exportation of natural phosphates varied from 194,800 tons, in 1900, to 154,900 tons, in 1901. The importation of nitrate of soda fell from 285,612 tons, in 1900, to 229,834 tons, in 1901. The exportation of superphosphates increased from 72,000 tons, in 1900, to 94,000 tons, in 1901, whilst manufactured manures fell from 127,000 tons, in 1900, to 94,000 tons. The industry has accordingly limited its production, and by this precaution, prices have been maintained, and, indeed, slightly increased. The bone-manure industry, which is an important one in this district, but which produces a far smaller quantity than the mineral manure factories, was easily able to get rid of its production owing to the high prices asked for mineral manures. But at the same time, the production of bone-manure is on the decrease, if not, perhaps, at Lyons itself, in the rest of France. The import of bones dropped from

* NOTE.—In the above article, the United States gallon (equal to $\frac{3}{4}$ of a British gallon) and the ton of 2,000 lb. must be understood.



39,000 tons, in 1900, to 19,000 tons, in 1901. It is to be remarked, however, that the figures of 1900 were abnormal, the average import of bones being 30,000 to 35,000 tons.

Glue and Gelatin.—The glue and gelatin industry suffered severely. Exports fell from 7,814 tons, in 1900, to 7,689 tons, in 1901, whilst the import rose from 1,766 tons, in 1900, to 1,867 tons, in 1901. This result caused some alarm in Paris, manufacturers there calling out for the imposition of protective duties. This measure was opposed by the Lyons producers, backed by the Lyons Chamber of Commerce.

Phosphorus.—The production of phosphorus again diminished. The exportation of white phosphorus fell from 243 tons, in 1900, to 135 tons, in 1901. Red phosphorus did better, the export increasing from 58 tons, in 1900, to 63 tons, in 1901.

Citric Acid.—The citric acid trade suffered with the others. Export fell from 165 tons, in 1900, to 132 tons, in 1901. The trade claims freedom from custom duties for raw citrate of lime, which tends to replace, as raw material, lemon juice, raw and concentrated.

Stearine and Soap.—The increase of 732 tons in the consumption of candles in France, in 1900, seems to have been quite exceptional. In 1901, there was a decrease amounting to 2,223 tons. In competition with gas, electricity, and spirits of wine, candles, which now pay duty, cannot compete; the sale must necessarily gradually decrease. The export of stearine must be limited to countries that have not the facilities offered by gas or electric light, such as Algeria and the East. The export has increased from 4,326 tons, in 1900, to 4,402 tons, in 1901. In this amount candles account for 2,955 tons.

In the custom-house tariff, stearic acid is taxed 8 fr. per 100 kilos. lower than candles, and this has caused the French market to be flooded with Belgian and Dutch raw stearic acid. The importation has increased from 123 tons, in 1899, to 3,149 tons, in 1901.

Dyestuffs.—The trade in dyestuffs, which started in Lyons upon the invention of Magenta, is becoming more and more dependent on Germany. With rare exceptions, all the Lyons factories are merely branches of German houses.

If treatment by electrolysis were to become general, it would cause a revolution in many of the chemical industries, and Lyons, on account of its reserve of hydraulic force from the Alps, should become the centre of the new industry.

X.—METALLURGY.

MINING IN BRITISH COLUMBIA.

U.S. Cons. Reps., Oct. 2, 1902.

A few years ago the mines around Rossland could not afford to ship ore valued at less than 16 dols. per ton. The charges for freight and smelter treatment amounted to 14 dols. Later, these charges were decreased to 11 dols. per ton, and about a year ago the smelters reduced the rate for freight and smelting to 6.50 dols. per ton. A recent contract made by certain mines with the smelter enables them to ship ore valued at 5 dols. per ton, although they ship a quantity of high-grade ore with the low-grade. The terms of the contract between these mines and the smelter are 4.50 dols. per ton for freight and treatment. This is most important for the future prosperity of Rossland, the majority of the ore mined around the city being of low grade. With these cheap rates for freight and smelting, there are hundreds of mines in the vicinity of Rossland which will become shippers almost immediately.

Every effort is being made by the managers of the mines to reduce the cost of concentration and refining of the ores. The Elmore process (this Journal, 1900, 251) is being introduced, and great hopes are entertained of the ultimate success of this system. It is understood that the owners of the Elmore patents have expressed their willingness to erect a plant, or to sell one of their plants to the mine owners.

A new smelter is being erected near Grand Forks, which is expected to handle 1,000 tons of ore per day. It is said that several improvements in smelting will be introduced.

Manufacturers of giant powder, dynamite, hardware, sanitary supplies, and all productions connected with smelters or mines should be represented.

There is also a market for hardware, crockery, glass, plumbers' supplies, machinery, printers' goods, stationery, drugs, leather goods, and harness.

XII.—FATS, OILS, Etc.

CANDLES AND SOAP IN CYPRUS, DIARBEEKIR, AND PERSIA.

Chamber of Com. J., Oct. 1902.

England and France share in the import of candles into Cyprus. France supplies it mostly with perfumery, England sends exclusively soaps of luxury, whilst ordinary soap is mostly imported from Greece. About 200,000 frs. worth is imported annually. The vilayet of Diarbekir imported, in 1900, stearine candles of the value of 18,000 frs., three-fourths of which were supplied by France, and one-fourth by Belgium. A cheap Antwerp brand threatens to gradually oust the French article entirely from the market. Attempts to cover the requirements by the importation of a bad quality from Constantinople have failed. Persia is a remunerative country for selling candles, especially in the interior of the country, where the consumption of petroleum is not yet as general as in the north. According to Persian statistics for 1900-1, candles of the value of 901,755 krāns (5 krāns = 2s.) were imported, the greatest portion of which was sent from Russia, England, and Belgium, whilst Austria's share in the importation was only trifling. The Russian candles are sold in packets containing six candles, 27 cm. long, the packet weighing 400 grms., for something less than 1 fr. The Belgium candles are only 20 cm. long, and somewhat cheaper. It is of importance to send candles to Persia in the autumn exclusively, as otherwise the heat melts stearine candles of every sort.

XIII. C.—INDIA-RUBBER, Etc.

RUBBER AND MANGROVE BARK IN EAST AFRICA.

Foreign Office Annual Series, No. 2903.

Rubber.—The value of rubber exported has fallen, in East Africa, to one-half that of last year, which is due to the fall in price as well as to the Somali rising. Uganda has exported rubber this year for the first time.

Mangrove Bark.—Mangrove bark has been shipped from the Lamu and Malindi districts for the past two years, and has been used in the preparation of a rich purple dye, which has been able to compete with chemical dyes.

XV.—MANURES, Etc.

PHOSPHATES AND FERTILISERS IN SOUTH RUSSIA.

Foreign Office Annual Series, No. 2904.

An establishment for the manufacture of superphosphates from coprolites is being built at Schmerinka. The requisite sulphuric acid will have to be brought from Poland. Tho was phosphates are made at Sardana, Mariupol, and Kertch. Next year it is proposed to raise the annual output to 50,000 tons.

The Imperial Minister of Agriculture is taking advice from experts as to the best means of bringing fertilisers into general use, especially in South Russia and the Caucasus.

XVI.—SUGAR, STARCH, Etc.

MAIZE STARCH OF BRITISH MANUFACTURE; DRAWBACK ON EXPORTS OF —.

Customs Gen. Order (No. 76 of 1902).

Collectors and other officers concerned are informed for guidance that the Board have directed that drawback be



allowed on exported maize starch of British manufacture at the rate of $2\frac{3}{4}d.$ per cwt.

"All duly substantiated claims in respect of British manufactured maize starch exported since the 7th May last inclusive will be settled in the usual manner by the Collector, London, at that rate accordingly."

BET SUGAR PRODUCTION OF EUROPE.

Foreign Office Annual Series, No. 2904.

The following table gives the number of factories in Europe, their production, area under cultivation, yield of roots per acre, &c., for the season of 1901-2.

Country.	Number of Factories.	Area under Cultivation.	Quantity of Roots used.	Quantity of Sugar produced.	Yield of Roots per Acre.	Yield of Sugar per Acre.	Percentage of Sugar to Weight of Beet.
		Acres.	Tons.	Tons.	Cwts.	Cwts.	
Germany	395	1,188,088	15,378,307	1,966,518	258½	33	12·8
France	383	709,302	9,123,748	956,591	257½	27	11·0
Russia	278	1,394,643	8,170,600	955,930	117	18½	11·5
Austria-Hungary	216	913,390	8,800,431	1,157,323	192½	25½	12·2
Belgium	107	173,668	2,468,532	287,778	234½	33	12·0
Holland	32	122,139	1,459,081	177,097	239	29½	12·4
Sweden	17	71,539	861,871	107,491	241½	30	11·7
Denmark	7	37,774	435,855	50,915	230½	27½	11·0
Total	1,385	4,610,543	46,703,425	5,659,648	..	..	..
" 1900-1	1,377	4,383,640½	39,485,477	4,923,300	..	..	..

From the above, it will be seen that, whilst Russia has the largest area under cultivation, she shows the lowest yield of roots per acre, and stands sixth in the percentage of sugar to weight of beet.

The consumption of sugar in Russia keeps steadily increasing, last year showing an increase of 56,451 tons. It now equals $11\frac{1}{4}$ lb. per head of the population.

XX.—FINE CHEMICALS, Etc.

MORPHIA IMPORT DUTY: PROPOSED PROHIBITION OF IMPORTATION INTO CHINA.

Bd. of Trade J., Oct. 2, 1902.

A duty of three taels (about $7s. 9d.$) per oz. will be levied on morphia from the 31st October next, when the new specific Tariff comes into force, and forward contracts will not be exempted. The treaty recently negotiated contains a clause prohibiting the importation of morphia except for medicinal purposes. This clause will not, however, become operative until the provisions of the Treaty have been agreed to by the other Treaty Powers, and morphia actually shipped before such date will not be affected.

MEDICINES AND THE TAX ON ALCOHOL IN GERMANY.

U.S. Cons. Reps., Sept. 27, 1902.

On October 1, 1902, the law exempting alcohol for medicinal purposes from taxation will be supplemented by an amendment, which requires alcohol for all purposes to pay the same tax. As this law will necessarily tend to make medicines, &c., in the preparation of which a large percentage of alcohol is used, more expensive, and as the different German States have a fixed drug tariff, the German Pharmacist Association is petitioning them to raise the price of all preparations in which alcohol is used, accordingly.

XXII.—EXPLOSIVES, MATCHES, Etc.

EXPLOSIVES IN FRENCH MINES (LOIRE DISTRICT).

Foreign Office Miscellaneous Series, No. 582.

The following table shows the explosives used in French mines:—

Explosive.	St. Etienne Group.		Rive de Gier Group.	
	1900.	1901.	1900.	1901.
	Lb.	Lb.	Lb.	Lb.
Dynamite	63,628	67,654	15,413	4,521
Grisounite and favier powder ...	49,836	65,301	19,250	11,715
Grisoutine	123,719	131,610	26,422	37,455
Black powder	56,806	42,033	2,695	2,552

The use of black blasting powder is gradually dying out, whilst, amongst safety powders, grisoutine is the most favoured. The amount of dynamite employed has also considerably decreased.

Patent List.

N.B.—In these lists, [A] means "Application for Patent," and [C.S.], "Complete Specification Accepted."

Where a Complete Specification accompanies an Application, an asterisk is affixed. The dates given are (i) in the case of Applications for Patents, the dates of application, and (ii) in the case of Complete Specifications Accepted, those of the Official Journals in which acceptances of the Complete Specifications are advertised.

Complete Specifications thus advertised as accepted are open to inspection at the Patent Office immediately, and to opposition within two months of the said dates.

I.—PLANT, APPARATUS, AND MACHINERY.

- [A.] 21,118. Patterson. Pyrometer. Sept. 29.
 ,, 21,181. Sewell. Evaporating-apparatus. Sept. 29.
 ,, 21,243. Berry and Smith. Heating- and cooling-apparatus. Sept. 30.
 ,, 21,484. Darling. Calorimeters. Oct. 3.
 ,, 21,543. Martins. Method for ascertaining the quantity of solid and liquid admixtures of gases, and apparatus used for carrying out this method.* Oct. 3.
 ,, 21,642. Boulton (Ziegler). Cooling-chambers, &c.* Oct. 4.
 ,, 21,650. Field. Manufacture of acid-proof vessels, &c. Oct. 4.
 ,, 21,718. Boulton (Kessler). Centrifugal apparatus. Oct. 6.
 ,, 21,729. Burton. Construction of blow-pipe. Oct. 6.
 ,, 21,782. James. Filter press.* Oct. 7.
 ,, 21,986. Mauser. Packing-cases for glass carboys, earthenware jars, &c., used for conveying acids, volatile liquids, &c.* Oct. 9.
 ,, 22,016. Reif and Von Reibnitz. Process and apparatus for the manufacture of plastic objects from peat, &c.* Oct. 9.
 ,, 22,213. Adams. Filter construction, and apparatus connected therewith. Oct. 13.
 ,, 22,221. Johnson. Heads of casks, vats, &c., for liquids, &c. Oct. 13.
 ,, 22,226. Saenger. Apparatus for impregnating air with medicinal vapours, &c.* Oct. 13.



- [A.] 22,256. Kiefer. Filters.* Oct. 13.
 „ 22,323. Griffin. Chemical and physical balances. Oct. 14.
 „ 22,362. Gebauer, Gebauer, and Haring. Receptacles for containing or administering volatile liquids.* Oct. 14.
 „ 22,363. Garde. Apparatus for measuring the density or specific gravity of gases or vapours. Oct. 14.
 „ 22,381. Zechmeister. Process for heating solid bodies for the purpose of drying, distilling, &c. Oct. 14.
 „ 22,382. Strehli. Process of producing moulded articles from fibrous material.* Oct. 14.
 „ 22,571. Guttman. Heat-exchanging apparatus.* Oct. 16.
 „ 22,664. Laidlaw and Macfarlane. Collapsible screens for separation of centrifugal machine effluents. Oct. 18.
- [C.S.] 22,301 (1901). Schwerin. Apparatus for the extraction of water, &c. from mineral, vegetal, and animal substances. Oct. 8.
 „ 9884 (1902). Smith. Filter-presses. Oct. 22.
 „ 11,035 (1902). Torkington (Knight). Apparatus for, and method of treating and working, bituminous and other compounds, and articles made therefrom. Oct. 22.
 „ 15,783 (1902). Postranecky. Stirring- and mixing-apparatus. Oct. 22.
 „ 17,663 (1902). Huillard. Apparatus for drying humid material reduced to grains, &c. Oct. 15. International Application, Feb. 10, 1902.
 „ 17,874 (1902). Melotte. Centrifugal separators for liquids. Oct. 15.
 „ 18,566 (1902). Baechler. Filtering apparatus. Oct. 15.
 „ 19,034 (1902). Von Seemen. Evaporating-apparatus. Oct. 22.
- II.—FUEL, GAS, AND LIGHT.
- [A.] 21,132. Doman and Streeten. Acetylene generating-apparatus. Sept. 29.
 „ 21,133. Doman and Streeten. Acetylene generating-apparatus. Sept. 29.
 „ 21,134. Lauder. Burners for acetylene and other illuminating gas. Sept. 29.
 „ 21,153. Poetter. Means or apparatus for reversing regenerative furnaces.* Sept. 29.
 „ 21,175. Applegarth. Apparatus for assisting combustion and preventing smoke in boiler, &c., furnaces.* Sept. 29.
 „ 21,197. Spiel. Burners for liquid fuel. Sept. 29.
 „ 21,240. Howorth (Beleuchtungs-Industrie Paul Flor). Incandescence gas-burners. Sept. 29.
 „ 21,226. Clark. Acetylene gas-generators. Sept. 30.
 „ 21,274. Adam and Adam. Manufacture of incandescent mantles, and burners therefor. Sept. 30.
 „ 21,279. Lowden. Manufacture of incandescing electric lamps. Sept. 30.
 „ 21,284. Goulton. Economic manufacture of anthracite duff or dust briquettes or the like fuel blocks. Sept. 30.
 „ 21,322. Herriot. Furnaces for the combustion of pulverulent fuels. Oct. 1.
 „ 21,346. Jandus Arc Lamp and Electric Light Co., Ltd., and Jones. Electric-arc lamps. Oct. 1.
 „ 21,465. Proskey. Hydrocarbon incandescent lamps.* Oct. 2.
- [A.] 21,586. Backeljau. Apparatus for purifying smoke and gas charged with dust, &c.* Oct. 3.
 „ 21,587. Ledermüller. Apparatus for carbonising peat.* Oct. 3.
 „ 21,611. Garrett (Garrett-Cromwell Eng. Co.). Heating-furnaces. Oct. 4.
 „ 21,615. Mitchell. Incandescent smokeless fuel. Oct. 4.
 „ 21,631. Longuemare and Longuemare. Carburettors for explosive motors, &c.* Oct. 4.
 „ 21,654. Imbert. Heating- and lighting-apparatus. Oct. 4.
 „ 21,735. Mackenzie (Eagle Oil-Burner Co.). Oil-burners.* Oct. 6.
 „ 21,742. Arter. Electric-arc lamps. Oct. 6.
 „ 21,746. Schroeder. Automatic gas-igniters.* Oct. 6.
 „ 21,748. Worsley. Arc electric-lamps.* Oct. 6.
 „ 21,769. Hookham. Electric incandescent lamps. Oct. 7.
 „ 21,778. Paranjape. Means for the consumption of smoke in steam-boiler, &c., furnaces. Oct. 7.
 „ 21,815. Stanley. Carburettors for making mixtures of hydrocarbon-vapour and air. Oct. 7.
 „ 21,831. Davy. Electric-arc lamps. Oct. 7.
 „ 21,861. Worsnop. Mantles for incandescent gas-lighting. Oct. 8.
 „ 21,929. Marshall and Kilby. Method of and means for increasing the illuminosity of gas, &c. Oct. 9.
 „ 21,964. Walker. Acetylene-generators. Oct. 9.
 „ 21,973. Richardson. Means for reducing smoke and economising fuel in steam-boiler, &c., furnaces. Oct. 9.
 „ 22,001. Faure. Carburettor for hydrocarbon motors.* Oct. 9.
 „ 22,002. West. Driving gear of charging and drawing machines for gas-retorts. Oct. 9.
 „ 22,040. Chiverton. "Atmospheric" and gas accumulator. Oct. 10.
 „ 22,049. O'Sullivan-Beare and Haslam. Process and apparatus for drying and preparing peat for use as fuel, &c. Oct. 10.
 „ 22,064. Moir. Arrangement for the application of liquid fuel to furnaces, kilns, &c. Oct. 10.
 „ 22,082. Berry. Furnaces and flues of steam-boilers, by which the production of smoke is prevented or reduced. Oct. 10.
 „ 20,092. Tully. Apparatus for the manufacture or production of gas for heating and illuminating purposes. Oct. 10.
 „ 22,180. Soc. Radiguet and Massiot. Electric ignition-devices for gas-burners.* Oct. 11. French Application, Apr. 9, 1902.
 „ 22,205. Eccles. Machines for use in the manufacture of fire-lighters, briquettes, &c. Oct. 13.
 „ 22,211. Lee and Parkin. Benzolene lamps. Oct. 13.
 „ 22,215. Slading. Acetylene gas appliances for illuminating and igniting purposes. Oct. 13.
 „ 22,224. Boulton (Flora). Incandescent burners for oil-burning lamps.* Oct. 13.
 „ 22,228. Hawes and Farrington. Device for intensifying the light of incandescent vapour or gas illumination. Oct. 13.
 „ 22,241. Reynolds (Hoffmann). Means or apparatus for automatically preventing the escape of gases when stoking gas-producers. Oct. 13.
 „ 22,242. Träsenster. Gas-valves for regenerative furnaces, &c.* Oct. 13.
 „ 22,282. Fowler and Medley. Apparatus for cleansing gas from gas-producers, blast-furnaces, and coke-ovens. Oct. 14.
 „ 22,325. Davison. Acetylene-generators for motor, &c. lamps. Oct. 14.



- [A.] 22,364. Garde. Apparatus for carburetting air. Oct. 14.
- „ 22,388. Clay (Holbrook). Manufacture of briquettes of fuel. Oct. 14.
- „ 22,425. Sutton. Apparatus for carburetting in gas or explosive vapour engines. Oct. 15.
- „ 22,457. Belin. Flame-burners. Oct. 15.
- „ 22,509. Heenan and Leask. Destructors or furnaces for burning refuse, &c. Oct. 16.
- „ 22,517. Wallis and Leading Light Syndicate, Ltd. Means for regulating the supply of water to carbide chambers of acetylene gas-generators. Oct. 16.
- „ 22,520. Kent. Apparatus for the direct conversion of hydrocarbon vapours and combustible gases mixed with air into heat. Oct. 16.
- „ 22,524. Duclos. Charon's carbonising process.* Oct. 16.
- „ 22,532. Rooney. Incandescent electric lamps.* Oct. 16.
- „ 22,538. Mecker. Eureka blast oil-burner.* Oct. 16.
- „ 22,561. Orvis. Means for consuming smoke in steam-generator furnaces.* Oct. 16.
- „ 22,593. Wild and Wild. Steam-generator furnaces. Oct. 17.
- „ 22,648. Von Anrep. Process and apparatus for disintegrating peat.* Oct. 17.
- „ 22,679. Huppenbauer. Process and apparatus for manufacturing combustibles. Oct. 18.
- „ 22,690. The Fietz (Preliminary) Syndicate, Ltd., and Grist. Mixtures and apparatus for carburetting air for lighting, heating, motive, &c., purposes. Oct. 18.
- „ 22,698. Watson. Acetylene-generators. Oct. 18.
- „ 22,699. Lessing and Wolff. Process for spraying glowing liquid blast-furnace cinder, and apparatus to be used in connection therewith. Oct. 18.
- „ 22,701. Guldlin. Devices for feeding air and steam to furnaces. Oct. 18.
- „ 22,704. Hellmann. Bunsen-burners with mantles hanging downwards. Oct. 18.
- [C.S.] 13,736. (1901). Watson. Furnaces for the destruction of town refuse. Oct. 15.
- „ 20,063 (1901). Locke. Construction of high-power oxyhydrogen mixed gas-jets. Oct. 15.
- „ 20,747 (1901). Boulton (Plaissetty). Manufacture of incandescent filaments and mantles. Oct. 22.
- „ 21,685 (1901). Gearing. Manufacture of steam-boiler furnaces, &c. Oct. 22.
- „ 21,151 (1901). Lake and Elliott. Self-generating vapour-burners or lamps. Oct. 8.
- „ 21,472 (1901). Kitson. Vapour-burning apparatus. Oct. 22.
- „ 21,764 (1901). Kitson. Vapour-burning apparatus. Oct. 15.
- „ 22,016 (1901). Crossley and Atkinson. Gas-producers. Oct. 15.
- „ 22,595 (1901). Edmondson. Apparatus for testing the quality of gases as fuel in internal combustion engines. Oct. 15.
- „ 22,891 (1901). Drake. Regenerative and other furnaces and kilns. Oct. 15.
- „ 23,038 (1901). Branson. Electric-arc lamps. Oct. 8.
- „ 23,214 (1901). Siemens Bros. and Co., Ltd. (Siemens and Halske Akt.-Ges.) Manufacture of a material for incandescent electric lamp filaments. Oct. 22.
- „ 23,459 (1901). Kitson. Vapour-burning apparatus. Oct. 22.
- „ 23,816 (1901). Graetz. Oil-burners for lighting and heating purposes. Oct. 8.
- „ 24,023 (1901). Cousin. Smoke-consuming furnaces. Oct. 15.
- [C.S.] 24,247 (1901). Clifford. Kilns, furnaces, &c., for firing, burning, and drying various goods. Oct. 15.
- „ 24,276 (1901). Jandus Arc Lamp and Electric Co., Ltd., and Jones. Electric-arc lamps. Oct. 8.
- „ 24,532 (1901). Dunne. Method for the manufacture of fire-lighters from peat. Oct. 15.
- „ 24,986 (1901). Blake (Hardt). Incandescent gas-burner. Oct. 15.
- „ 25,519 (1901). Fallor. Methods for consuming smoke, and apparatus therefor. Oct. 15.
- „ 25,616 (1901). Helbing. Process of manufacture of peat briquettes. Oct. 8.
- „ 2001 (1902). McNally. Appliances or chambers for purifying acetylene or other gas. Oct. 22.
- „ 5084 (1902). Meenen. Incandescent lamp for use with vaporised or gasified liquid fuel. Oct. 8.
- „ 7471 (1902). Watson and Watson. Furnaces for forced draught, and ventilating apparatus to be used in connection therewith. Oct. 22.
- „ 7884 (1902). Coulson. Manufacture of artificial fuel. Oct. 22.
- „ 11,059 (1902). Lake (Rheinisch-Westfälische Maschinenbau-Anstalt and Eisengieserei G. m. b. H. Abteilung Metallwarenfabr. Bochum). Miners' lamps. Oct. 8.
- „ 11,076 (1902). British Thomson-Houston Co., Ltd. (Licé). Electric-arc lamps. Oct. 8.
- „ 11,705 (1902). Wilson and Heist. Vapour-burners for heating purposes. Oct. 22.
- „ 13,086 (1902). Russell and Clausen. Gas arc-lamps. Oct. 8. International Application, June 28, 1901.
- „ 14,527 (1902). Trautmann. Smoke-consuming devices for furnaces, &c. Oct. 8.
- „ 15,261 (1902). Bullier and Maquenne. *See under VII.*
- „ 15,262 (1902). Bullier and Maquenne. System of apparatus for the purification of acetylene and other gases containing solid or vesicular particles in suspension. Oct. 22. International Application, July 12, 1901.
- „ 15,528 (1902). Montupet. Furnaces for heating asphalt, &c. Oct. 8.
- „ 15,691 (1902). Laurenus. Charcoal retorts and furnaces. Oct. 15.
- „ 15,731 (1902). Stefan and Schönfelder. Gas-burner. Oct. 15.
- „ 16,027 (1902). Stoclet. Manufacture of block-fuel. Oct. 15.
- „ 16,613 (1902). Bottomley. Means for consuming smoke in furnaces. Oct. 22.
- „ 17,201 (1902). Arnott and Arnott Light and Burner Co. Hydrocarbon vapour-burners. Oct. 15.
- „ 17,213 (1902). Brookes (Deutsche-Luxemburgische Bergwerks und Hütten Akt.-Ges.). Means or apparatus for purifying blast-furnace gases. Oct. 8.
- „ 17,603 (1902). Bousfield (Finke). Manufacture of mantles for incandescence lighting. Oct. 15.
- „ 18,234 (1902). Stillman. Hydrocarbon lamp. Oct. 8.

III.—DESTRUCTIVE DISTILLATION, TAR PRODUCTS, PETROLEUM.

- [A.] 21,145. Wetter (Rütgerswerk-Akt.-Ges.). Deodorisation of tar- and mineral-oils. Sept. 29.
- „ 21,546. Currie. *See under XXII.*
- „ 21,548. Wetter (Rütgerswerk-Akt.-Ges.). Process for deodorising tars and mineral oils. Oct. 3.
- [C.S.] 11,035 (1902). Torkington (Knight). *See under I.*
- „ 15,528 (1902). Montupet. *See under II.*



IV.—COLOURING MATTERS AND DYESTUFFS.

- [A.] 21,193. Ellis (Soc. Chim. des Usines du Rhône, anciennement Gilliard, P. Monnet, and Cartier). Treatment of indigo. Sept. 29.
- " 22,078. Read Holliday and Sons, Ltd., Turner, Dean, and Turner. Manufacture of yellow to orange nitro-colouring matters. Oct. 10.
- " 22,534. Read Holliday and Sons, Ltd., Turner, Dean, and Turner. Manufacture of intermediate compounds, and colouring matters therefrom containing sulphur. Oct. 16.
- [C.S.] 20,201 (1901). Wise (Iljinskij and R. Wedekind und Co.). Manufacture of flavo-purpurine. Oct. 15.
- " 21,879 (1901). Johnson (Kalle and Co.). Manufacture and production of black colouring matters containing sulphur. Oct. 8.
- " 22,123 (1901). Newton (Farbenfabr. vorm. F. Bayer und Co.). Manufacture and production of new derivatives of the anthraquinone series. Oct. 8.
- " 22,222 (1901). Johnson (Kalle and Co.). Manufacture and production of brown dyes containing sulphur. Oct. 8.
- " 22,306 (1901). Ransford (Cassella and Co.). Manufacture of dyestuffs. Oct. 8.
- " 22,583 (1901). Newton (Farbenfabr. vorm. F. Bayer und Co.). Manufacture or production of anthraquinone derivatives. Oct. 8.
- " 22,733 (1901). Imray (Farbwerke, Höchst). Manufacture of phenylglycine, its homologues, and salts thereof. Oct. 8.
- " 22,762 (1901). Johnson (Bad. Anilin und Soda Fabr.). Manufacture of colouring matters of the anthracene series. Oct. 15.
- " 22,838 (1901). Newton (Farbenfabr. vorm. F. Bayer und Co.). Manufacture or production of derivatives of the anthracene series. Oct. 22.
- " 25,697 (1901). Johnson (Bad. Anilin und Soda Fabr.). Manufacture of new substantive colouring matter containing sulphur, and material for use therein. Oct. 15.
- " 25,809 (1901). Johnson (Bad. Anilin und Soda Fabr.). Manufacture and production of new colouring matters containing sulphur. Oct. 8.
- " 26,058 (1901). Imray (Farbwerke, Höchst). Manufacture of indoxyl. Oct. 22.
- " 26,448 (1901). Shillito (Aniline Colour and Extract Works, formerly J. R. Geigy and Co.). Sulphur dyestuff. Oct. 22.

V.—TEXTILES: COTTON, WOOL, SILK, Etc.

- [A.] 21,440. Southwood. Manufacture of surfaces for, and apparatus used in, cylinder-printing on textile and like fabrics. Oct. 2.
- " 21,847. Downham. Mercerising cloth. Oct. 8.
- " 21,848. Burghardt and Reid. Process or processes for decreasing the inflammability of cotton fibres and fabrics. Oct. 8.
- " 21,915. Ellis (Kron). Manufacture from short-fibre asbestos, cellulose, &c., of rolls capable of being drawn off in strips suitable for spinning, twisting, &c. Oct. 8.
- " 22,000. Rolland. Dyeing, washing, and bleaching of textile materials. Oct. 9.
- " 22,095. Carmichael, Carmichael, and Carmichael. Processes for dyeing and finishing.* Oct. 10.
- " 22,235. Hahn. Machine for mercerising yarn in the form of skeins.* Oct. 13.

- [A.] 22,285. Brandwood. Perforated skewers for use in dyeing. Oct. 14.
- " 22,382. Strehli. *See under I.*
- " 22,468. Walker. Apparatus for treating flax, &c.* Oct. 15.
- " 22,605. Sutherland. Method of degumming or cleansing stalk and leaf fibres. Oct. 17.
- " 22,682. Markus and Barnwell Machine Co., Ltd. Manufacture of fabrics faced or coated with finely comminuted materials. Oct. 18.
- [C.S.] 19,912 (1901). Ashwell. Treatment or finishing of yarn. Oct. 8.
- " 6664 (1902). Lake (Fries). Machines for steaming, oxidising, drying, or otherwise treating yarns, fabrics, &c., specially applicable for use in connection with dyeing apparatus. Oct. 15.
- " 11,878 (1902). Fredenburgh. Machines for dyeing, sizing, &c., thread. Oct. 22.
- " 12,042 (1902). Woodhead and Orr. Treatment of ramie and other fibrous substances. Oct. 15.
- " 12,603 (1902). Behnisch. Process and machine for shrinking woven fabrics. Oct. 8.
- " 14,675 (1902). Klaunder. Apparatus for mercerising and treating fibres, &c. Oct. 22.

VI.—COLOURING WOOD, PAPER, LEATHER, Etc.

- [C.S.] 14,685 (1902). Pfister. Staining of wood. Oct. 15.

VII.—ACIDS, ALKALIS, SALTS, Etc.

- [A.] 21,120. Pictet and Pictet Syndicate, Ltd. Method of and apparatus for the production of liquid air. Sept. 29.
- " 21,218. Hargreaves. Storing and transporting chlorine. Sept. 30.
- " 21,242. Hughes. Apparatus for producing oxygen gas.* Sept. 30.
- " 21,828. Pauling. Process for the manufacture of nitric dioxide and nitric acid.* Oct. 7.
- " 21,832. Marshall. Apparatus for producing ozone. Oct. 7.
- " 22,099. Stanley. Apparatus for the preparation of nitrates, &c. Oct. 10.
- " 22,100. Stanley. Crystallisation of nitrates, &c. Oct. 10.
- " 22,135. Gilmour. *See under XI.*
- " 22,527. Brindley. Manufacture of oxide of iron. Oct. 16.
- [C.S.] 19,374 (1901). Hartridge. Chemical fire-engines, and analogous fire-extinguishing appliances. Oct. 8.
- " 19,902 (1901). Wenmaekers. Manufacture of sulphuric acid. Oct. 15.
- " 19,919 (1901). Lange. Receptacles for compressed or liquid gases. Oct. 8.
- " 14,386 (1902). Lederlin. *See under XI.*
- " 15,261 (1902). Bullier and Maquenne. Solid compound containing alkaline hypochlorite, and the various applications thereof, particularly for the purification of acetylene and other gases. Oct. 15. International Application, July 9, 1901.

VIII.—POTTERY, GLASS, AND ENAMELS.

- [A.] 21,272. Moore. Manufacture of glass receptacles. Sept. 30.
- " 22,243. Newton (Sievvert). Glass vessels.* Oct. 13.
- " 22,500. Mellowes. Roof-glazing. Oct. 16.
- " 22,650. Degens. Process for or method of embossing glass. Oct. 17.



- C.S.] 21,331 (1901). Pfister. Manufacture of cloisonné mosaics and windows. Oct. 15.
 „ 24,247 (1901). Clifford. *See under* II.
 „ 16,675 (1902). Haley. Moulds for manufacturing glassware. Oct. 22.

IX.—BUILDING MATERIALS, CLAYS, MORTARS, AND CEMENTS.

- [A.] 21,283. Goulton. Economic manufacture of bricks, &c. Sept. 30.
 „ 21,386. Michell. Manufacture of non-conducting coverings, blocks, &c., suitable for covering steam-pipes, &c., and for other purposes. Oct. 1.
 „ 21,387. Michell. Manufacture of non-conducting coverings, blocks, &c., suitable for covering steam-pipes, &c., and for other purposes. Oct. 1.
 „ 21,446. Harnett. Manufacture of artificial grinding stones. Oct. 2.
 „ 21,480. Alexander. Kilns or ovens for burning cement, &c. Oct. 2.
 „ 21,540. Silley. Renewable fire-clay bridge-block. Oct. 3.
 „ 21,606. Brooke. Damp-proof blocks, &c. Oct. 4.
 „ 21,646. Ringel. Manufacture of embossed material, applicable for decorating walls, &c.* Oct. 4.
 „ 21,795. Wallis. Machinery for the manufacture of artificial stone goods, such as flags, paving-stones, &c. Oct. 7.
 „ 21,915. Ellis (Kron). *See under* V.
 „ 22,005. Curry. Manufacture of refractory bricks. Oct. 9.
 „ 22,291. Vaesen. Production of refractory materials, artificial stone, &c. Oct. 14.
 „ 22,480. Kalweit. Building blocks.* Oct. 15.
 „ 22,555. McDougall. Electric insulating material. Oct. 16.
 „ 22,556. McDougall. Electric insulating fabrics. Oct. 16.
 „ 22,625. Collinson. Building-bricks. Oct. 17.
 „ 22,717. Putnam. Admixture or composition to be mixed with or applied to cements, &c. Oct. 18.
 „ 22,723. Belt. Machine for fire-proofing paper, &c. Oct. 18.
 „ 22,734. Bamber. Manufacture of Portland cement, and apparatus therefor. Oct. 18.
 „ 22,735. Bamber. Manufacture of Portland cement. Oct. 18.
 „ 22,736. Bamber. Manufacture of Portland cement, and apparatus therefor. Oct. 18.
 [C.S.] 19,474 (1901). Croizier and Thomine. Compound-ing of artificial stone. Oct. 8.
 „ 20,447 (1901). Thompson (Croizier et Cie.). Apparatus for hardening bricks, tiles, &c. Oct. 22.
 „ 22,796 (1901). Jackson. Rotary kilns. Oct. 22.
 „ 23,962 (1901). Burghardt, Hall, and Jones. Tiles, &c. for walls, &c., for use in the construction or decoration of buildings generally. Oct. 8.
 „ 24,247 (1901). Clifford. *See under* II.
 „ 24,393 (1901). Sangwin. Manufacture of artificial stone. Oct. 22.
 „ 24,580 (1901). Wilkinson. Manufacture of materials for pavements. Oct. 15.
 „ 25,118 (1901). Aslatt. Compositions or covering material for steam-generators, boilers, &c., to prevent or reduce radiation of heat. Oct. 15.

X.—METALLURGY.

- [A.] 21,323. Moorhouse. Gold extractor and concentrator. Oct. 1.
 „ 21,334. Boor and Muir. Precipitating gold from solutions containing it. Oct. 1.

- [A.] 21,391. Conein. Process of treating mattes and raw metals in reverberatory furnaces. Oct. 1.
 „ 21,449. Riemer. Process and apparatus for preventing the formation of blow-holes or cavities in steel and other metal castings.* Oct. 2.
 „ 21,552. Lennox. Method for the preparation of copper and its alloys for casting. Oct. 3.
 „ 21,621. Schürmann. Figured bar-iron. Oct. 4.
 „ 21,693. Bradley and Mone. Process for the manufacture of all kinds of steel from cast pig or ferro-ore. Oct. 6.
 „ 21,750. Knoth. Manufacture of steel.* Oct. 6.
 „ 21,807. Westinghouse (Knox). Linings of vessels for metallurgical work. Oct. 7.
 „ 21,829. Surzycki. Smelting furnaces for the continuous production of steel. Oct. 7.
 „ 21,880. Rouse. Method of consolidating iron-sand into lumps for reduction in furnaces. Oct. 8.
 „ 22,004. Willans and Robinson, Ltd., and Eaton-Shore. Method of casting metals. Oct. 9.
 „ 22,225. Burton and Hartley. Manufacture of steel. Oct. 13.
 „ 22,294. Jensen (Goldschmidt and Mathesius). Process of manufacturing homogeneous metal castings. Oct. 14.
 „ 22,302. Mayer. Grinding mill or machinery apparatus for crushing, grinding, or washing brass foundry ashes, slag, &c., metal dross, metal ores, &c., also applicable as a mortar for crushing, &c., other suitable materials. Oct. 14.
 „ 22,392. Martino. *See under* XX.
 „ 22,594. Wimbury. Process of and means for casting ingots of steel, &c. Oct. 17.
 „ 22,752. Kjarsgaard and Pedersen. Tinning of cast-iron. Oct. 18.
 [C.S.] 13,115 (1901). Fyfe. Apparatus for producing and depositing fumes from ores. Oct. 8.
 „ 20,077 (1901). Sebillot. Process for the treatment of copper ores for the recovery of the metals. Oct. 15.
 „ 22,387 (1901). Rey and Gregory (Wessell). Refining of spelter. Oct. 15.
 „ 22,554 (1901). Lorrain (Thomson). Process of making alloys. Oct. 15.
 „ 23,790 (1901). Lamberton. Crushing and amalgamating machinery for the reduction of quartz, and the recovery therefrom of the precious metals, and the grinding or pulverising of other materials. Oct. 22.
 „ 24,026 (1901). Mumford. Method of and apparatus for the recovery of precious metals from ores and slimes. Oct. 8.
 „ 5796 (1902). White. Manufacture of steel. Oct. 22.
 „ 12,516 (1902). Huxley. Furnaces for annealing metal, &c. Oct. 8.
 „ 16,274 (1902). Shadforth. Furnace for use in fusing or otherwise treating metals, minerals, &c., where high temperatures are required. Oct. 15.

XI.—ELECTRO-CHEMISTRY AND ELECTRO-METALLURGY.

- [A.] 21,201. Adam (Engelmann). Process and apparatus for the manufacture of accumulator - plates. Sept. 29.
 „ 21,846. Bate. Apparatus for electro-deposition of metals on small articles. Oct. 8.
 „ 21,901. Schmitt and Fabre. Electric-accumulators. Oct. 8.
 „ 22,057. Marsden. Wind or water motors, and accumulators for use therewith. Oct. 10.



- [A.] 22,135. Gilmour. Electrolytic decomposition of alkaline chlorides. Oct. 11.
 „ 22,426. Bley. Galvanic double battery. Oct. 15.
 [C.S.] 26,237 (1901). Blanc. Accumulators or secondary batteries. Oct. 22.
 „ 5209 (1902). King. Magnetic ore separators. Oct. 15.
 „ 14,386 (1902). Lederlin. Electrolytic manufacture of chlorates and perchlorates. Oct. 15. International Application, Jan. 8, 1902.

XII.—FATS, OILS, AND SOAP.

- (A.) 21,162. Nairn. Apparatus for the manufacture of mosaic linoleum floor-cloth, &c. Sept. 29.
 „ 21,190. Peryer. Composition for cleaning smooth surfaces and such as are varnished.* Sept. 29.
 „ 21,408. Wilding and Stott. Product for cleansing or renovating the polished or varnished surfaces of wood, &c. Oct. 2.
 „ 21,546. Currie. *See under XXII.*
 „ 21,662. Balcke. *See under XVIII. B.*
 „ 21,678. Greer. Filters or strainers of petrol, oil, &c. Oct. 6.
 „ 21,899. Heitz and Hazard. Method of and apparatus for storing toilet-soap. Oct. 8.
 „ 22,111. Counstein. *See under XX.*
 „ 22,118. Blake. Soap. Oct. 10.
 „ 22,427. Gill. Emulsion for softening paints or varnishes, &c., prior to their removal from woodwork, &c. Oct. 15.
 „ 22,576. Wirt. *See under XVIII. B.*
 [C.S.] 14,098 (1901). Lilley and Bentote. Night-lights, &c. Oct. 22.
 „ 17,988 (1901). Weygang. Treatment of oils, fats, and other saponaceous materials. Oct. 15.
 „ 20,976 (1901). Yates and Yates. Pumps for lubricants and other liquids. Oct. 15.
 „ 22,315 (1901). Pepler. Candle-moulding machines. Oct. 22.

XIII.—PIGMENTS, PAINTS; RESINS, VARNISHES; INDIA-RUBBER, Etc.

A.—Pigments, Paints.

- [A.] 21,441. Heatley. Coating of metal and other surfaces to protect them from atmospheric and other influences, and apparatus therefor. Oct. 2.
 „ 21,692. Hatmaker (Ruston). Casein coating and paint compositions. Oct. 6.
 „ 22,663. Oliphant and Elworthy. Process and apparatus for the manufacture of white lead. Oct. 18.
 [C.S.] 24,815 (1901). Cranstone. Mill for grinding paint, &c. Oct. 22.

B.—Resins, Varnishes.

- [A.] 21,546. Currie. *See under XXII.*

C.—India-rubber, &c.

- [A.] 22,618. Raper. Method of impressing designs on india-rubber.* Oct. 17.

XIV.—TANNING, LEATHER, GLUE, AND SIZE.

- [A.] 22,729. Marter, Hanbury, and Gardner. Manufacture of improved products for use in lieu of leather, raw hide, ivory, &c., in the manufacture of various articles. Oct. 18.
 „ 22,738. Chemische Dungerfabr. Vogtmann und Cie., G. m. b. H., and Weiss. Process for the manufacture of glue and gelatin from leather and leather waste.* Oct. 18.
 [C.S.] 19,249 (1901). Gautier. Manufacture of artificial leather. Oct. 8.

- [C.S.] 16,710 (1902). Schmalfluss. Process of manufacturing adhesive mediums. Oct. 15.
 „ 18,042 (1902). Hilbert. Manufacture of gelatine and glue from bones. Oct. 15.

XV.—MANURES.

- [A.] 22,101. Mülertz. *See under XVIII. B.*
 [C.S.] 63. (1902). Schulte-Steinberg. Manufacture of Thomas powder from Thomas slag. Oct. 8.

XVI.—SUGAR, STARCH, GUM, Etc.

- [A.] 21,146. Wetter (Weinrich). Purification and preservation of raw sugar. Sept. 29.
 „ 21,454. Lagrange. Process for the extraction and instantaneous crystallisation of sugar from any syrup, in free air and by refrigeration, in sugar factories and refineries.* Oct. 2.
 „ 22,537. Duryea. Process of producing maltose syrups and sugars.* Oct. 16.

XVII.—BREWING, WINES, SPIRITS, Etc.

- [A.] 21,271. Ramsey. Distillation and purification of alcoholic liquids. Sept. 30.
 „ 21,351. Sleeman. Treatment of grain for the production of malt. Oct. 1.
 „ 21,479. Adam (Broux and Godin). Decantation, aération, and refrigeration of beer, &c. Oct. 2.
 „ 21,643. Lapp. Fermentation of beer.* Oct. 4.
 „ 21,721. Lapp. Process for manufacturing mash from malt.* Oct. 6.
 „ 21,731. Lapp. Brewing.* Oct. 6.
 „ 21,749. Lapp. Malting.* Oct. 6.
 „ 21,839. Meacock. Means for discharging the contents of mash-tubs, &c. Oct. 7.
 „ 22,307. Haskin. Method of ageing or maturing spirits and wine. Oct. 14.
 [C.S.] 16,523 (1902). Nicholas and Evans. Preparation of bottled malt liquors, cyder, perry, and wines and spirits. Oct. 15.

XVIII.—FOODS, SANITATION, Etc., AND DISINFECTANTS.

A.—Foods.

- [A.] 21,194. Hudson. Reduction of grain products. Sept. 29.
 „ 21,230. Allison (Trescott). Curing food products.* Sept. 30.
 „ 21,293. Davidson. Fish-food preparation. Sept. 30.
 „ 21,294. Sandmann and Eichelbaum. Preservation of fruit juices, &c. Sept. 30.
 „ 21,383. Potter. Animal food, and process or method of preparing the same. Oct. 1.
 „ 21,416. Mullins. Process for rendering more digestible cereals and leguminous substances for feeding horses, &c. Oct. 2.
 „ 21,510. Vogtherr. Process of and apparatus for testing butter. Oct. 3.
 „ 21,617. Hatmaker (Just). Drying and preserving milk. Oct. 4.
 „ 21,770. Pedersen. Cream-separators. Oct. 7.
 „ 21,804. Smith. Means for packing and preserving eggs. Oct. 7.
 „ 21,877. Barrath. Manufacture of plate- or block-ice.* Oct. 8.



- [A.] 21,878. Hatmaker. Process of making macaroni and other foods containing casein. Oct. 8.
 „ 22,162. Shonten and Spencer. Process for preserving milk, cream, &c., and means and appliances therefor. Oct. 11.
 [C.S.] 14,340 (1902). Baker. Processes for preserving food. Oct. 22.
 „ 14,341 (1902). Baker. Processes for preserving food. Oct. 22.
 „ 15,640 (1902). Davidson, Rowley, and Runwick. Apparatus applicable for separating and treating grain products, and for scouring grain. Oct. 15.

B.—Sanitation; Water Purification.

- [A.] 21,297. Crosfield and Markel. Treating sewage and manufacturing refuse-liquor containing organic matter. Sept. 30.
 „ 21,662. Balcke. Apparatus for separating oil and other constituents from waste steam. Oct. 4.
 „ 22,094. Loock. Process for the sterilisation of fluids.* Oct. 10.
 „ 22,101. Mülertz. Manufacture of meal or powder for use as sewage, manure, &c. Oct. 10.
 „ 22,389. Maignen. Water-purifying apparatus. Oct. 14.
 „ 22,390. Lowe. Composition for removing or preventing incrustations in steam-generators, and for cleaning liquor-pumps and connections, &c. Oct. 14.
 „ 22,416. Watson and Billetp. Filters, especially low-pressure feed-water filters, &c. Oct. 15.
 „ 22,576. Wirt. Feed-water heaters, purifiers, condensers, and oil-separators. Oct. 16.
 [C.S.] 17,581 (1901). Lowe. Sewage, &c., filters. Oct. 8.
 „ 21,316 (1901). Malabar. Purification of sewage, &c. Oct. 22.
 „ 21,746 (1901). Putzeys. Means of and apparatus for purifying water. Oct. 8.
 „ 23,907 (1901). Macauley. Method of forming combined wood and metal channels for the distribution of sewage or sewage-effluents over the surface of filter-beds, and regulating the levels of the same. Oct. 8.
 „ 12,788 (1902). Kaysser. Method for sterilising and maintaining sterilised drinking-water. Oct. 8.
 „ 12,635 (1902). Mountany and Farnsworth. Apparatus or means for distributing sewage. Oct. 15.
 „ 18,948 (1902). Ham. Valves or gates for sewers, bacteria or filter-beds, &c. Oct. 22.

XIX.—PAPER, PASTEBOARD, Etc.

- [A.] 21,306. Walmsley and Co., Ltd., and Walmsley. "Strainers" of paper-making machines. Oct. 1.
 „ 21,582. Lake (Marshall). Pulp-beating machines.* Oct. 3.
 „ 21,915. Ellis (Kron). See under V.
 „ 22,089. Pope and Mullen. Beating-engines for use in the manufacture of paper.* Oct. 10.
 „ 22,478. Balston and Briggs. Treatment of cellulose material, and the manufacture of articles therefrom. Oct. 15.

XX.—FINE CHEMICALS, ALKALOIDS, ESSENCES, AND EXTRACTS.

- [A.] 21,904. Dunbar. Serum, and the method of preparing the same. Oct. 8.
 „ 21,985. Tallqvist. Means for determining the proportion of hæmoglobin in blood.* Oct. 9.
 „ 22,096. Behrens, jun. Manufacture of concentrated acetic acid.* Oct. 10.
 „ 22,111. Connstein. Process for the decomposition of esters of fatty acids. Oct. 10.
 „ 22,254. Finkler. Extraction of albumin from substances containing the same. Oct. 13.
 „ 22,353. Lake (Kämpff). Serum, and method of producing the same. Oct. 14.
 „ 22,392. Martino. Treatment of metallic compounds of cyanogen. Oct. 14.
 „ 22,710. Carpenter. Manufacture of sulphocyanide of calcium.* Oct. 18.
 [C.S.] 25,706 (1901). Newton (Farbenfabr. vorm. F. Bayer und Co.). Manufacture and production of pharmaceutical compounds. Oct. 22.
 „ 16,855 (1902). Hanssen. Process for producing medicinal preparations of hæmoglobin. Oct. 22.

XXI.—PHOTOGRAPHY.

- [A.] 21,512. Grün. Method of taking three-colour photographic negatives without the use of extraneous colour-screens. Oct. 3.
 „ 21,537. Archer. Surfaces for receiving photographic prints.* Oct. 3.
 [C.S.] 20,164 (1901). Askham. Printing photographs by artificial light. Oct. 15.
 „ 22,727 (1901). Newton (Farbenfabr. vorm. F. Bayer und Co.). Manufacture or production of photographic plates and papers. Oct. 22.
 „ 17,485 (1902). Boulton (Mile Colour Photograph Co.). Colour photographs, and method of making the same. Oct. 15.

XXII.—EXPLOSIVES, MATCHES, Etc.

- [A.] 21,171. Hough. Explosives.* Sept. 29.
 „ 21,189. Poetter. Manufacture of a safety explosive or blasting substance.* Sept. 29.
 „ 21,546. Currie. Manufacture of matches and tapers covered with wax, paraffin, stearin, resinous gums, &c. Oct. 3.
 „ 22,540. Weston. Explosive or blasting-powder. Oct. 16.
 „ 22,645. Schachtebeck. Manufacture of safety explosives.* Oct. 17.
 „ 22,665. Walker. Appliances for extracting matches from dipping-frames. Oct. 18.
 [C.S.] 21,621 (1901). Safety Explosives, Ltd., and Thiersch. Explosives. Oct. 8.
 „ 22,965 (1901). Cocking and Kynoch, Ltd. Explosives. Oct. 22.
 „ 24,917 (1901). Greenwood and Breakspear. Machinery for loading cartridge-cases with cordite or other stranded explosive compound. Oct. 15.

